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ORIGINAL ARTICLES

SOME TECHNIQUES FOR MEASUREMENT OF THE GASEOUS METABOLISM OF HUMANS

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THE Nutrition Laboratory is continually making basal metabolism measurements and for these measurements it has various types of metabolism apparatus. In the constant use of these apparatus modifications and improvements in techniques have been developed, which it is the purpose of this paper to present. Since the Nutrition Laboratory has until recently employed chiefly the Benedict-Collins respiration apparatus[1] and since this same apparatus has been used in many other laboratories, the technique involved in the use of a modified form will first be discussed.

A MODIFIED CLOSED-CIRCUIT RESPIRATION APPARATUS

The Benedict-Collins respiration apparatus gives excellent clinical results and is sufficiently accurate for most physiological experimenting. Other laboratories have had much difficulty with the apparatus, but the fact remains that with it thousands of experiments have been made at the Nutrition Laboratory and elsewhere without accident. The unsatisfactory features of the technique have been fully recognized, however, and frequently commented upon in our publications[2]. Practically all of these unsatisfactory features developed in the concessions made to portability, which was demanded by clinical workers. Analyzed in detail, they are (1) the placing of a small, electrically driven, rotary air-impeller inside of the spirometer in an atmosphere of highly oxygenated air, (2) the placing of the soda-lime (which absorbs carbon dioxide and absorbs or gives off water vapor, depending on the type of soda-lime) inside of the spirometer, and (3) the difficulties in computing the exact volume of the contraction of the gas in the spirometer bell, which indicates the oxygen absorption. In the original form of portable apparatus[3] the soda-lime was not inside of the spirometer and this particular error was overcome, but in the later form all of these "weak points" were wittingly included. The present form, which is to be described, sacrifices a certain degree of portability, but aims to avoid the theoretical as well as practical defects of the earlier types.

Blower. To ventilate the apparatus suitably when valves were not employed and to insure a supply of carbon doixide-free air for each inspiration, a blower was necessary. Our long experience with the Crowell blower left little to be desired, save that its weight and the necessity for a rather large motor precluded its use in the portable or semi-portable apparatus. No external blower was available that was sufficiently light in weight and at the same time absolutely tight, and it is only recently, after many years of experimenting in the Nutrition Laboratory, that a high-speed, rotary air-impeller has been constructed* which meets the conditions of smoothness of action and absence of leaks necessary for a good closed-circuit apparatus. Accordingly, the ventilator may now be removed from the bell of the spirometer and the new blower placed in the air pipe outside of the spirometer. By placing the blower outside two obvious difficulties are eliminated, i. e., the danger of electrical ignition and combustion inside of the spirometer bell (which has been experienced by workers outside of the Nutrition Laboratory) and the development of heat by the electric current necessary to run the motor (which affects the temperature of the air in the bell).

Soda-lime container. By placing the blower outside of the spirometer the distinct objection of having the air in the spirometer bell contain carbon dioxide is also avoided, as the air may now enter the bell free from carbon dioxide, either by directing the air into the bottom of the soda-lime container or by placing the soda-lime container outside of the spirometer. It is better to have the soda-lime outside, since the heat developed in the absorption of carbon dioxide by the soda-lime when inside of the spirometer is troublesome, although repeated tests have

*Constructed with the assistance of Mr. W. E. Collins, 584 Huntington Avenue, Boston, Massachusetts, from whom all the apparatus described in this article may be secured.

shown that a most satisfactory, although "rule of thumb" correction can be applied. Any suitable form of soda-lime container may be used, but in the Nutrition Laboratory it is commonly placed in one of the later models of soda-lime bottle[4].

Computation of the oxygen consumption. The contraction in the volume of air in the spirometer bell (which represents the oxygen consumption) is affected profoundly by temperature, and when the blower and the soda-lime are placed inside of the spirometer there are at least three sources of temperature disturbance; (1) the heat of the motor, (2) the heat of absorption of carbon dioxide, and (3) the heat of absorption of water vapor by the soda-lime, particularly in the low-moisture soda-limes. But perhaps the most puzzling feature is the element of uncertainty with regard to the degree of humidity in the air inside of the bell. These two factors, humidity and temperature, necessitate corrections in the calculation of the oxygen consumption, corrections which have confused many workers. Both of these corrections enter into the calculation, no matter what form of soda-lime is used, but unfortunately, in addition, the corrections vary depending upon the particular form of apparatus used. Based upon the Nutrition Laboratory's experience, the following methods of calculation are recommended.

Correction for humidity. When the Benedict-Collins apparatus with blower and soda-lime inside the bell is used, the best procedure is to calculate the volume of oxygen consumed on the assumption that the air is saturated. In this case the type of soda-lime used makes no difference, as saturated air is exhaled from the lungs of the subject directly into the spirometer bell and the side of the bell is also wet, which helps to keep the air saturated. The 2 per cent reduction of the final figure, recommended by Roth[6], is not necessary in this case. When the Benedict-Collins apparatus with soda-lime inside but with valves instead of blower is used, or when the Roth modification with valves and with soda-lime inside is used, the air is assumed to be dry. If moist soda-lime is employed, the figure is reduced 2 per cent*, but if the modified Haldane[5] soda-lime is used, this final 2 per cent reduction is not made.

Correction for temperature. The correction for temperature, which is entirely independent of the correction for humidity, is smallest with the moist soda-lime, greatest with the dry, and of course still greater when the blower is inside of the spirometer bell. The factor for the temperature correction depends upon the volume of the spirometer which is greatly increased if the soda-lime and blower are placed outside. In the case of the Benedict-Collins apparatus, either with internal or external blower and soda-lime or with valves instead of the blower, the correction for temperature is made by adding to the difference in height of the spirometer bell 1.8 mm. for each rise of 1° C. in the temperature of the bell. In the case of the Roth modification with valves, however, the height of the spirometer bell is much less than with the ordinary Benedict-Collins spirometer, and the volume of the bell is therefore much less. Roth recommends for this apparatus (with which short, 6-minute periods are customary) that the correction in temperature be 0.5 mm. for each rise of 1° C. and that it be applied against the difference in height of the spirometer bell, as usual. Strictly speaking, this factor for the temperature correction should be based upon an actual calibration of the spirometer to be used, as the factor may not always be exactly 1.8 mm. for each degree.

These technical difficulties were, as already stated, in large part encountered in an effort to secure for clinicians a strictly portable respiration apparatus not involving gas analysis or weighings. Undoubtedly too great concessions were made to portability. A personal tour of many institutions and hospitals has shown that rarely are any of the modern forms used in a strictly portable way, and that almost without exception patients are brought to the hospital or laboratory room where the apparatus is installed. When true portability is necessary, it is believed that a compact form of the student apparatus[8] is more accurate than any clinical observations would warrant. For the best physiological work, when the respiration apparatus is to be installed more or less permanently in a laboratory or hospital, all of the difficulties outlined above can be eliminated by using a combination of blower, external soda-lime bottle, and spirometer (the latter not being in the circuit). Because of the difficulties in computing the oxygen contraction, due to the uncertainty of humidity conditions and the rather large changes in the temperature of the air in the bell noted with some forms of the apparatus, it seemed best to ventilate the system in such a way as to have the air in the spirometer bell always saturated with water vapor. The following modifications of the Benedict-Collins portable respiration apparatus[1] are therefore suggested, based upon the foregoing findings.

The apparatus is shown schematically in figure 1. The spirometer may be of any form, provided the level of its bell can be read to within 10 c.c. The soda-lime container may obviously be any air-tight form of bottle or can with free air passage. As will be seen by reference to figure 1, the carbon-dioxide-rich air leaving the lungs at the mouthpiece, A, is drawn by the motor-blower, C, through the soda-lime bottle, B, where all the carbon dioxide is absorbed. The air is then forced

*If the temperature of the apparatus is 5° C. or more over or below 20° C., it is better to use Wilson's table[7] for reduction to 0° C. and 760 mm., in order to obtain the most accurate results.

back to the mouthpiece, passing on its way the connection leading to the spirometer, D. By thus having direct connection with the spirometer, which is obviously at atmospheric pressure, there is no pressure in the system and respiration is very free. The connection with the spirometer is such that the main ventilating air circuit does not pass through it.

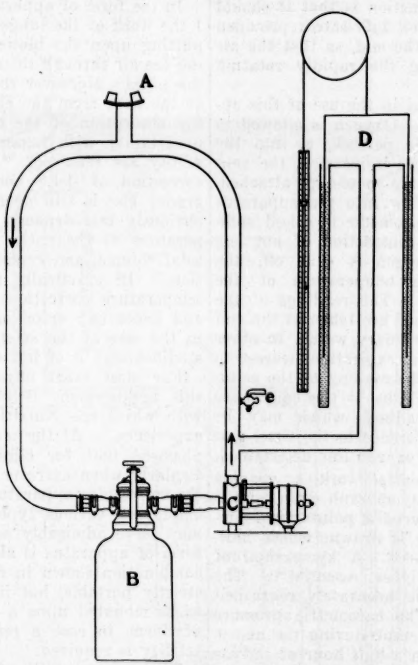

FIG. 1. Modified closed-circuit respiration apparatus.
A, mouthpiece; B, soda-lime bottle for absorption of carbon dioxide; C, blower for circulation of air; D, spirometer; e, petcock for introduction of oxygen.

Several types of spirometers have been used in exactly this arrangement of apparatus. A small spirometer made primarily for vital capacity studies, having a capacity of 6.5 liters, is large enough for this purpose, although one should specify that the counterweight be supplied with a pointer travelling over a fixed millimeter scale. Essentially this type of spirometer is shown in outline in figure 1.

In the air circuit, as shown in figure 1, about 500 c.c. of air pass into and out of the spirometer with each respiratory cycle. This air is free from carbon dioxide, but contains a varying amount of moisture. To insure that the oxygen in the spirometer is completely saturated with water vapor, a circular disk of wet blotting paper with a hole cut in the center is placed on the top of the spirometer under the bell. If a spirometer is used in which originally the soda-lime can or electric blower was inside and which therefore has two outlets, one of these outlets is closed, and it has been our custom to lay a rubber sponge, soaked with water, in the body of the spirometer. As the air leaves the circulating pipe at each expiration, it comes in contact with the wet sponge or the wet blotting paper, and consequently the air inside of the bell remains saturated. There is thus with each respiration a wavelike motion of 500 c.c. of air into and out of the spirometer, amounting to about 6 or 7 liters per minute, but there is always a regular contraction of the bell due to the consumption of oxygen and at the end of each minute the volume of air in the bell is from 150 to 300 c.c. less than at the start.

This contraction is always a contraction of saturated air. To confirm this experimentally a second thermometer was placed temporarily in the cover of the bell, the bulb of the thermometer being covered with wet linen. The temperature of the two thermometers always remained the same. Indeed, with this arrangement of the

circulation there is rarely any change in temperature inside of the bell.

While the soda-lime container shown in figure 1 is one of the standard bottles employed in the Nutrition Laboratory, obviously any form may be used. The rotary blower here illustrated has been recently developed and gives the highest degree of satisfaction. The important point in its construction is that it should have a long bearing, well lubricated, provided with a stuffing box on the end, so that the air cannot leak out along the rapidly rotating shaft.

The technique involved in the use of this apparatus is very simple. Oxygen is allowed to flow slowly through the petcock, e, into the system. The mouthpiece is inserted, the ventilator started, and the nose-clip attached. Oxygen is allowed to flow into the apparatus until the bell in the spirometer is raised sufficiently to allow for a contraction of not less than 150 mm. The oxygen is shut off, the petcock closed, and the temperature of the spirometer is recorded. The readings of the level of the spirometer bell are taken at the end of each minute on an ordinary watch. In other words, at the end of the expiration nearest to the end of the minute the reading of the counterpoise is recorded. Thus at the end of 10 minutes one has 11 readings which may be quickly plotted with reference to the time, and the general slope of the oxygen line determined.

For the best physiological work a graphic record is made on the kymograph drum of the movements of the counterpoise pointer and simultaneously a base line is drawn, which indicates the time in minutes. A kymograph of constant speed is the highest essential.* The time markings should be accurately controlled with a good watch. The barometric pressure should be recorded sometime during the experiment, or at least within a half hour of the experiment.

The calculations of the results are best made from the kymograph tracing. By laying a ruler or thread along the lower edge of the curve indicating the points where the expirations ended, it is possible to draw a straight line representing the general slope of the curve. From the base line and time markings perpendiculars can be erected at the first and last minutes, and the difference between the altitudes of these perpendiculars represents the total fall of the spirometer bell during the time recorded between the perpendiculars.

Temperature corrections are very slight with this bell, but are made according to the usual plan of multiplying the rise in temperature (in degrees Centigrade) by 1.8† and adding this value, expressed in millimeters, to the observed fall of the spirometer. This corrected value, multiplied by the bell factor, represents the *apparent* volume of oxygen consumed in a given length of time, and must be reduced to 0° C. and 760 mm., assuming that the gas is saturated with water vapor. This calculation is carried out by the usual table provided for this purpose[9].

In the form of apparatus illustrated in figure 1 the work of the lungs has been eliminated by putting upon the blower the work of circulating the air through the air purifier and through the pipes. Moreover the objectionable features of the heat from the electric blower and from the absorption of the carbon dioxide and the uncertainty with regard to the degree of humidity are removed. The slight temperature correction of +1.8 mm. per degree (Centigrade) rise is still open to some criticism, for obviously this depends upon the average temperature of the entire system as well as the total volume, and remains an empirical correction. In practically all work, however, this temperature correction is at most very small, and hence any error in the factor 1.8 (or 0.5 in the case of the smaller volume of the Roth modification) is of but slight significance.

For most exact physiological experimenting this arrangement is preferable to any other with which the Nutrition Laboratory has had experience. At the same time it must be emphasized that for clinical purposes and particularly when extreme portability is necessary the spirometer apparatus with soda-lime inside, employing various types of blowers or valves, may serve admirably and the simplest student form of apparatus is also very accurate. The combination shown in figure 1 is by no means strictly portable, but it is sufficiently compact to be mounted upon a small, movable table or platform, in case a reasonable degree of portability is required.

The accuracy of the apparatus was controlled by the same method employed in connection with all new apparatus in the Nutrition Laboratory, namely, by alcohol check tests with the mechanico-chemical device[10]. The connections with this device are shown schematically in figure 2. Three typical alcohol check tests showed an oxygen consumption of 170, 175, and 181 c.c. per minute, these amounts representing 98.4, 100.3, and 100.6 per cent, respectively, of the theoretical amounts consumed.

A SMALL PORTABLE FORM OF RESPIRATION APPARATUS*

While there are numerous types of respiration apparatus designated as "portable" or "transportable," this designation refers almost invariably to the relation between the apparatus and the operator, and yet there are many

*The Nutrition Laboratory has used several of the Collins chronokymografs with perfect satisfaction.

†The smaller the total volume of air in the system, the smaller this factor. See page 808.

*This apparatus was publicly demonstrated at a meeting of the Harvard Medical Society at the Peter Bent Brigham Hospital in Boston, Massachusetts, in February, 1925.

problems in which it is necessary for the subject himself to transport the apparatus, such as, for example, when walking. In the earlier experiments of Zuntz and his associates[11] complicated and extremely heavy respiration apparatus was carried on the back. Durig[12] reports that this equipment often weighed as much as 11 or 12 kg. The apparatus here to be described was designed primarily to be a light-weight apparatus which the subject could easily carry in his hand and which would enable the rapid determination of the oxygen consumption during walking.

The apparatus consists of a small, flat, light weight copper can, filled with soda-lime and covered with a rubber bathing cap* provided with an index, having a tube to connect with the mouth and a petcock for the admission of oxygen. This apparatus, when charged with soda-lime, weighs 2.0 kg. It is shown in figure 3. The metal can, A, is 150 mm. in diameter and 54 mm. high. Fitted inside of the can is a brass ring covered with wire gauze, D, which holds the soda-lime in place and telescopes just inside of the can. The index, c, on top of the bathing cap, F, rises and comes in contact with

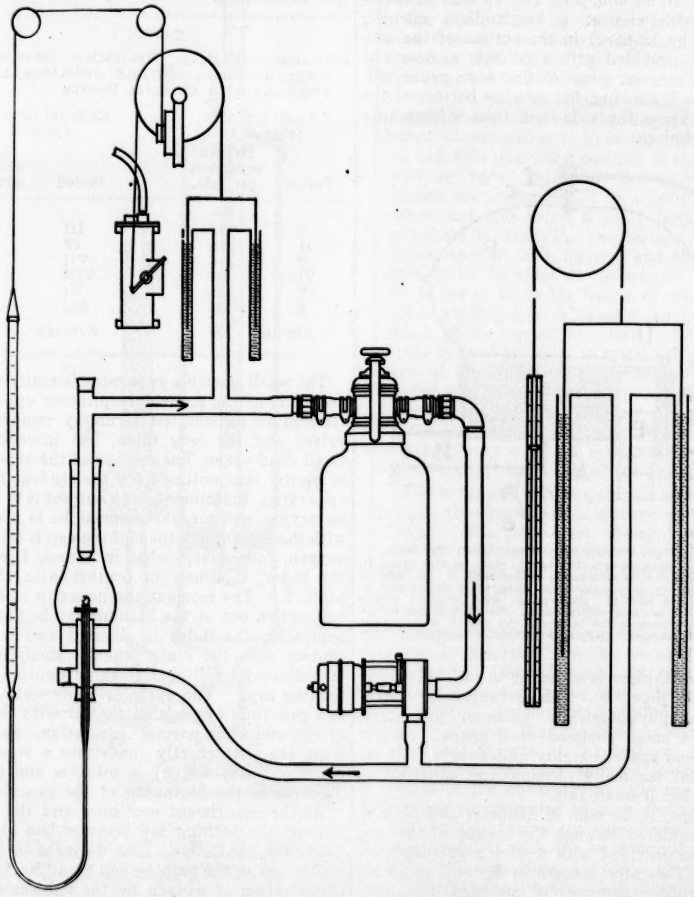

FIG. 2. Modified closed-circuit respiration apparatus connected with mechanico-chemical device for controlling its accuracy.

*While rubber bathing caps are relatively inexpensive, it has been found advisable to cover them with a black cloth when they are not in actual use. This prolongs their life greatly, as they deteriorate in light much more rapidly than when covered.

a thin brass plate, f, 25 mm. in diameter screwed to the long support, g, attached at the lower end of the pipe, E, used as a fixed point to which the index, c, is raised by introducing oxygen at the beginning and end of the experiment. The bathing cap, F, is firmly attached to the can by means of a stout rubber band, a. The pipe, B, 90 mm. long and 25 mm. in diameter, is soldered over a longitudinal opening (51 mm. by 19 mm.) in the bottom of the can, A, and is provided with a petcock, e, near one end. A circular piece of fine wire gauze, soldered to a brass ring, fits into the bottom of the can and keeps the soda-lime from sifting into the mouthpiece.

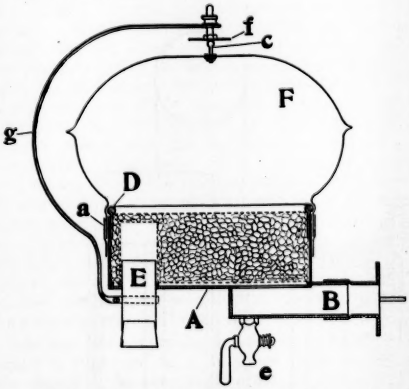

FIG. 3. Small portable form of respiration apparatus.

The can, A, contains soda-lime held in place by wire gauze, D. The bathing cap, F, is attached by rubber band, a. Its index, c, may rise until it touches the brass plate, f, on the support, g, attached to the pipe, E. The pipe, E, may be closed with a rubber stopper or fitted with a valve. The pipe, B, fits over a longitudinal opening in the bottom of the can, A, and connects with the mouthpiece. Oxygen is introduced through the petcock, e.

The mouthpiece is attached to the end of the horizontal pipe, B. This arrangement introduces a physiologically unsound procedure, namely, a small enclosed dead space. While such a dead space is highly undesirable, it is believed that for many physiological experiments it plays but a small role.

The pipe, E, 25 mm. in diameter and 55 mm. long, is soldered through the bottom of the can, A, and is provided with a wire gauze cap over one end. This pipe (shown in figure 3 as closed with a rubber stopper) is not used in experiments when the apparatus is carried in the hand. In a modification of the apparatus (see figure 8, page 817) for transportation on the back, this pipe serves for the attachment of a valve.

The apparatus is designed to be transported in the hand and is not designed to take the place of the existing forms of apparatus for basal metabolism measurements. That it may be used successfully for such tests, however, is shown by a series of measurements (see table 1) on a well-trained subject lying quietly on a bed. In this series a comparison was made between this small portable apparatus and the special apparatus with external blower (shown in figure 1), which is considered the most satisfactory and most accurate form in use in the Nutrition Laboratory.

TABLE 1

COMPARISON OF BASAL METABOLISM MEASUREMENTS WITH THE SMALL PORTABLE APPARATUS AND THE APPARATUS WITH EXTERNAL BLOWER

Small portable (Figure 3)		External blower type (Figure 1)	
Period	Oxygen consumed per min.	Period	Oxygen consumed per min.
	c.c.		c.c.
I	192	III	195
II	194	IV	195
V	196	VII	188
VI	202	VIII	207
IX	195	XI	198
X	189	XII	196
Average	195	Average	197

The small portable apparatus is really a modified form of the student respiration apparatus[8], reduced to its simplest terms by removing the valves and the long tubes, but introducing a small dead space. The routine of the experiment is exactly that outlined for the student form of apparatus. Inasmuch as the subject is to breathe an oxygen-rich air, the moment he is connected with the mouthpiece the bathing cap is filled with oxygen, indeed somewhat in excess, i. e., until the index, c, comes in contact with the thin plate, f. The moment the nose-clip is applied, respiration out of the bathing cap begins. With expiration the index is elevated and comes in contact with the plate, when a small pressure is indicated by slight lateral distention of the bathing cap. The operator waits until the index *just fails to come in contact* with the plate at the end of a normal expiration, and then notes the time exactly (on either a stop watch or an ordinary watch) in minutes and seconds. This marks the beginning of the experiment.

As the experiment continues and the oxygen is used, the bathing cap becomes less distended with each expiration. The decrease in the volume of air in the bathing cap resulting from the consumption of oxygen by the subject and the absorption of carbon dioxide by the soda-lime indicates the amount of oxygen consumed in a given time. With this apparatus the oxygen consumption is measured by introducing a known amount of dry air under ordinary conditions of rest, or by introducing dry oxygen when work is being performed. At the end of the experiment air or oxygen must be introduced to bring the index back to exactly the position that it had when the experiment began.

This is usually accomplished by introducing a little excess air, producing a slight tension upon the bathing cap as at the beginning of the experiment, and then at that moment when a normal expiration just fails to cause the index

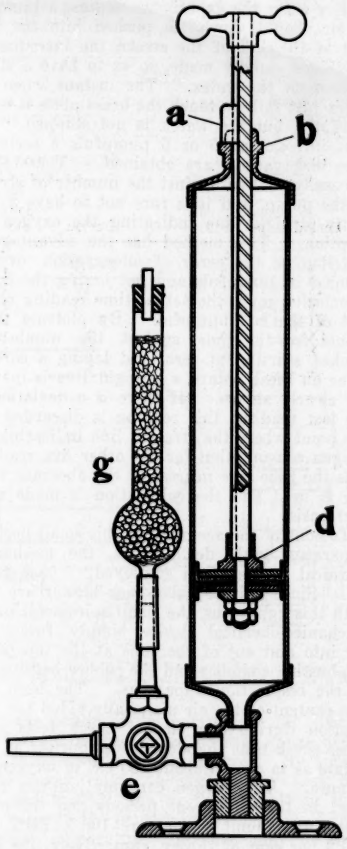

FIG. 4. Air pump.

At the top of the barrel of the pump is a guiding key, a, soldered to the nut, b. At the end of the piston rod is a metal collar, d. The 3-way valve, e, communicates with outdoor air through the calcium-chloride tube, g, or with the respiration apparatus itself.

to touch the plate the time is noted. The interval between the time recorded at the start and at the end represents the elapsed time during which the volume of gas introduced has been consumed.

AIR PUMP

While the amount of oxygen or air introduced may be measured in a number of ways, the Nutrition Laboratory commonly employs a simple automobile grease gun, originally described in connection with the student form of apparatus.[8] This grease gun, when well lubricated and provided with well-fitting washers, serves admirably, but for the best work experience has shown that slight changes in its construction are advantageous. (See details in figure 4.)

The pump must be absolutely tight. At the same time it must move freely enough to enable a woman technician to use it without difficulty. The length of stroke must be unalterable, and to provide against slight, possible irregularities in the surface of the barrel it has been found advantageous to have the piston and piston rod held in a fixed position so that it cannot twist or turn inside of the barrel. These changes are accomplished by substituting a new piston rod and using slightly larger brass or iron disks to draw the two leather washers together, spread their flanges, and thus insure a close fit to the sides of the barrel. A small slot is sawed along the length of the piston rod and a guiding key, a, is soldered to the metal nut, b, at the top of the pump. The length of stroke is fixed by metal to metal contacts at both ends of the stroke. Thus, when the handle is pushed way in, it comes in contact with the key, a, or the two nuts on the other end of the shaft hit the lower end of the pump. When the handle is drawn way out, the metal of the collar, d, strikes against the inside of the top of the pump.

The lower end of the pump is soldered to the barrel; the upper end is screwed on with a fine thread. The top part should not be unscrewed. If for any reason its original position is altered, one should frequently measure the total length of pump stroke, which is usually not far from 200 mm.

For actual use the pump may be mounted as originally described[8], in the horizontal position on a board. It is believed that in general the horizontal position is the best. For many tests the vertical position is desirable. Figure 4 shows the pump thus mounted to standard pipe plates and fittings at the bottom. Instead of relying upon ordinary screwed joints, the connection at the bottom is usually well soldered. The exit is provided with a 3-way valve, e, which, when turned in one direction, allows communication with the outdoor air through a calcium-chloride tube, g (which dries the air), and when turned in the other direction communicates directly with a pipe leading to the respiration apparatus itself.

In the use of these pumps it is highly important that several rules be observed. (1) The hand should never be placed upon the barrel of the pump. (2) The piston should be pushed way in and drawn way out so as always to get the complete length of stroke. In those instances where a fraction of a stroke is used, this must be carefully measured with a millimeter

scale. (3) The 3-way valve must be turned always at the end and at the beginning of a stroke and never midway. (4) When air is taken into the barrel of the pump under any pressure conditions other than strictly atmospheric, momentary connection with the atmosphere should be made to insure atmospheric pressure. (5) A thermometer reading to a tenth of a degree should be placed with its bulb in contact with the barrel.

The pump is calibrated (a) by calipering the inside of the barrel at 10 or more points and computing the area, or (b) by discharging a definite number of strokes into a previously calibrated spirometer. A standard, inexpensive automobile "2-inch" grease gun has furnished the body of the pump, and numerous pumps have shown a volume of 1.872 c.c. per millimeter length of stroke.

The importance of the pump being absolutely tight under conditions of air delivery cannot be over-estimated. It is best to check this frequently. The simplest method is to produce a slight excess pressure inside the pump and note on a water manometer if the pressure holds. A 10-cm. length of glass tubing is attached by means of a short length of rubber tubing to the discharge nipple in the 3-way valve. The end of the glass tube dips 2 or 3 cm. under water in a beaker. Starting with the piston at its highest point, a small amount of air is caused to bubble through the water by slowly pushing down on the handle. On removing the hand, the water should remain depressed inside the tube. If it rises even a few millimeters, there is a leak. If it remains constant, more air is expelled until the piston is about one-quarter of the way down. The water level inside the glass tube should remain constant at this and all other positions of the piston, for the pump should be tested again with the piston half way down, three-quarters of the way down, and entirely down. When the vertical pump is used, the piston rod should be held so that there will be no tendency for the piston to settle by its own weight; otherwise a false test is secured.

The general usefulness of the pump for accurately metering oxygen or air, particularly in small volumes, can be strongly emphasized. It is used regularly in metering the oxygen consumption of individual albino rats in a respiration apparatus[13] at Teachers College, Columbia University, New York, in a coöperative research with Professor Grace MacLeod.

When the small portable apparatus is used in resting experiments, such as outlined in table 1, the amount of oxygen-rich air in the bathing cap at the start of the experiment is such as to make it perfectly feasible to introduce for a 10-minute experiment not oxygen but room air. Hence the pump as shown in figure 4 is directly employed to draw room air through the calcium chloride in the tube, g, into the barrel, and then, by turning the 3-way valve, e, to discharge it into the petcock at the bottom of the portable apparatus. Indeed, instead of waiting until the end of the 10-minute period, it is better to follow the technique of Mrs. C. G. Benedict[8]. Thus, immediately after the experiment begins, a pumpful of air should slowly be pushed into the bag, and at the end of the stroke the introduction should be rapidly made, so as to have a slight tension on the index. The instant when the index just fails to touch the brass plate is noted carefully, but the watch is not stopped. By thus introducing 5 or 6 pumpfuls a series of time observations are obtained. These times are easily plotted against the number of strokes of the pump, and it is rare not to have a perfectly straight line indicating the oxygen absorption. This method has the advantage of distributing the error of observation over a number of pumpfuls and not basing the entire calculation upon the actual time reading at the end of the last pumpful. By plotting the 6 points for the time against the number of strokes, starting at zero, and laying a cord or ruler on these points, a straight line is inevitably clearly shown. If there is a deviation in the last reading, this reading is discarded and the point where the straight line indicating the oxygen consumption for the other five readings cuts the time line nearest to the aberrant reading is used and the calculation is made upon that basis.

To control the accuracy of this small portable apparatus with dead space, the mechanico-chemical device[10] was employed. (See figure 5.) Since neither valves nor blower are used with this apparatus, the small spirometer of the mechanico-chemical device simply forces the air into and out of the tube at the top of the combustion chamber and the rubber bathing cap of the respiration apparatus. The high oxygen content of the air materially aided the combustion during the alcohol check tests. In these check tests the alcohol was burned at such a rate as to absorb about 180 c.c. of oxygen per minute. The oxygen consumption was measured in three different periods and the apparatus was found to measure 100.5, 101.1, and 101.3 per cent of theory, respectively, the average being 101.0 per cent.

USE OF SMALL PORTABLE APPARATUS IN WORK EXPERIMENTS

When work is being performed and more than 6 pump strokes are to be used in the experiment, it is best to introduce not air but oxygen. Under these conditions, since the oxygen is always secured in compressed cylinders and in these cylinders is very dry, one can dispense with the calcium-chloride tube. The arrangement of the apparatus for work experiments is shown schematically in figure 6. In this instance there is attached to one arm of the

3-way valve a ⅛-inch tee tube, from which is suspended an ordinary rubber football bladder. This is first three-fourths filled with oxygen (the football bladder being collapsed at the start). Under these conditions there is no measurable pressure inside of the bag. By

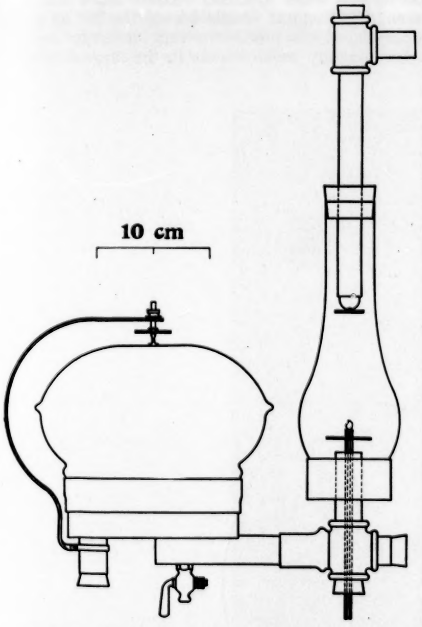

FIG. 5. Small portable form of respiration apparatus connected with mechanico-chemical device for controlling its accuracy.

raising the piston of the pump, with the 3-way valve turned in the proper position, pure oxygen is thus drawn into the barrel. By turning the 3-way valve the oxygen may then be discharged through the upright nipple in the 3-way valve to the petcock on the bottom of the respiration apparatus. Oxygen may be admitted to the football bladder as frequently as desired, provided no appreciable tension is put upon it. This method is used quite extensively for experimental problems such as walking, when the apparatus is to be carried in the hand of the subject. The assistant walks behind the subject, carrying the pump and football bladder.

This arrangement suffices for short walking experiments, but if basket-ball bladders are substituted in place of the football bladder, much larger volumes of oxygen can be introduced into these bladders and the experiment can be continued somewhat longer. Indeed the use of the basket-ball bladder has in many ways supplanted that of the pump for walking and work experiments, in that two basket-ball bladders fitted with a 2-way stopcock have been used. It is necessary to have a short preliminary period at the start of the experiment, when the rubber bathing cap is distended slightly. This is done by connecting the respiration apparatus with one of the basket-ball bags shown in figure 7. One of these bags is only partly distended and contains an unknown amount of oxygen. The other one contains, prior to the experiment, a definite number of full pump strokes and hence *an accurately metered* amount of oxygen. At the beginning of the experiment the initial adjustment of the level of the rubber bathing cap

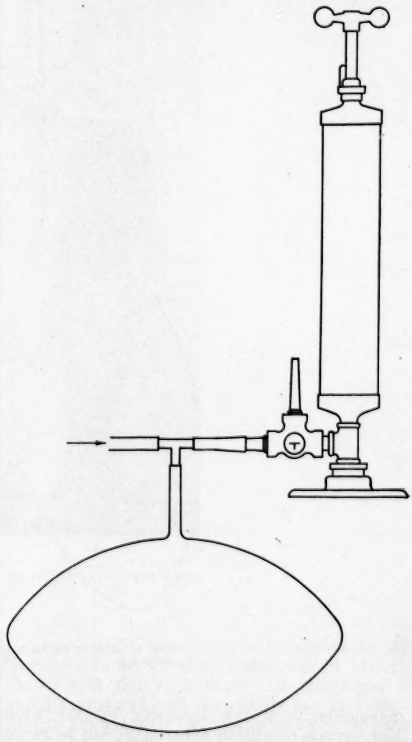

FIG. 6. Air pump and football bladder as used with small portable form of respiration apparatus in work experiments.

is made by introducing oxygen from the bag containing the unknown amount of oxygen. The 2-way stopcock is then turned to connect with the other bag and the experiment is continued until the total volume of air in the metered bag is used up. The time in minutes and seconds necessary for this consumption is accurately

noted. This method does not give a series of short periods corresponding to individual full pump strokes, as in the case of rest experiments, but the oxygen consumption during severe work is frequently so rapid that the pump could not be filled and emptied fast enough for satisfactory use. On the other hand, a rubber basket-ball bladder containing 10 to 15 pumpfuls of oxygen (i. e., 3 to 4 liters) would serve for an experiment lasting from 1 to 6 minutes,

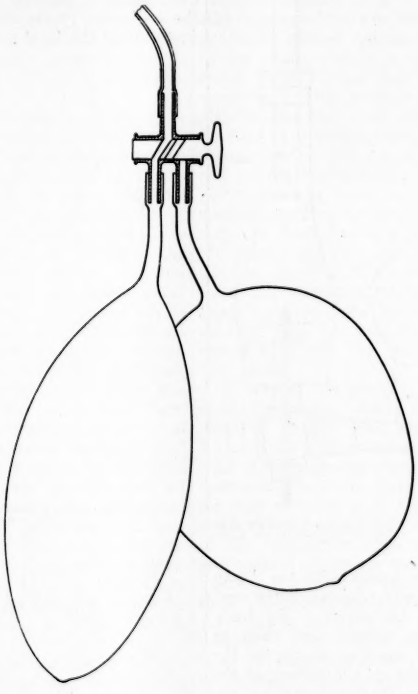

FIG. 7. Rubber basket-ball bladders for use in severe work experiments.

depending upon the intensity of the work. Moreover, a repetition experiment can be rapidly made, as with this type of apparatus no time-consuming gas analysis and subsequent calculations are necessary, nor is it necessary to measure the total volume of expired air. The use of the two bags, as shown in figure 7, is best applied to rather severe working experiments other than walking, and for this purpose a somewhat different disposition of the entire apparatus is made.

A KNAPSACK APPARATUS FOR MEASURING THE OXYGEN CONSUMPTION DURING WORK*

A type of apparatus which will not interfere with the subject's vision, which will leave both hands free for mechanical and other forms of work, which is not heavy and a burden for the back, and which does not involve the measurement of the total ventilation of the air or gas analysis, makes possible a very accurate study of the energy requirements in the large field of mechanical and industrial operations. Such an apparatus is shown in figure 8, from which it is seen that the apparatus is not carried in the hands, but is placed upon a very lightweight knapsack and attached to the back. Instead of having a dead space between the mouthpiece and the soda-lime, two tubes long enough to carry the air to and from the mouth over the back are supplied, and expiratory and inspira-

*This apparatus was publicly demonstrated at a meeting of the Harvard Medical Society at the Peter Bent Brigham Hospital in Boston, Massachusetts, on February 24, 1925.

tory valves are directly attached to tubes B and E in the small portable respiration apparatus (figure 3). This equipment (as shown in figure 8), when filled with soda-lime, has a total weight of 4 kg. The shoulder supports are constructed of light-weight brass tubing, flattened on the under side, and all the other supports are made of ⅛-inch pipe fittings. The mouthpiece is supported between two curved uprights leading from the shoulder supports, being attached to these uprights by a stout rubber band. Thus the subject has a clear vision and the hands are left free.

In this type of apparatus the lungs must circulate the air by opening and closing valves. The technique is precisely that indicated for the apparatus when carried in the hand, only oxygen must always be introduced and not air. The length of the experiment is determined solely by the amount of soda-lime in the can and the amount of work to be done. With 500 grams of soda-lime the oxygen consumption may amount to more than 6 liters without any evidence of rebreathing of carbon dioxide. The rubber band about the bathing cap makes it possible to change and renew the soda-lime very easily.*

The apparatus is well adapted to various forms of muscular work. Indeed, it has been used very successfully for studying such muscular effort as that of sawing wood, which brings in a very vigorous shoulder movement and lateral movement of the apparatus and mouthpiece. Obviously the equipment finds its special use under conditions where the subject is moving about freely.

FIG. 8. Knapsack apparatus for measuring the oxygen consumption during work.

The use of the two basket-ball bladders for the introduction of oxygen is essential in experiments with this apparatus. The technique is rapidly acquired and the results can be known almost immediately at the conclusion of the test. The *reduced* volume of oxygen introduced into the basket-ball bladder is known, indeed before the experiment begins, and the time required to absorb this is recorded. The oxygen consumption per minute is consequently obtained by division of the volume by the time.

*After refilling, the apparatus is quickly tested for tightness by closing the openings, placing a metal ring weighing 50 grams on the bathing cap and introducing air until the index just touches the plate. A leak is noticeable in 30 seconds.

A RESPIRATION APPARATUS FOR CONTINUOUS, SEVERE STATIONARY WORK

In many industrial operations involving severe muscular work the subject remains in a relatively fixed position. In such cases it is highly desirable to employ apparatus in which the experimental period may be prolonged and repeated observations made. The student form of apparatus lends itself admirably for this purpose when the degree of muscular work is not excessive, but the effort of the lungs required in moving the air through the tubes and pipes and in opening and closing valves during severe muscular labor is such that it is impractical to use this apparatus for *prolonged,* severe work. This is quite in line with much of the experience with gas masks during the late war, when it was found that under the stress of severe muscular work the lungs could not be sufficiently ventilated through the valves.

The apparatus shown in figure 9, in which the central feature is the can containing the soda-lime and the rubber bathing-cap top of the student form of apparatus, has been devised for studies during severe muscular work of stationary character and has proved highly satisfactory. The container, A, with soda-lime in place and bathing cap on top, has the usual support for the index needle, but the valves are removed and the movement of air to and from the subject is now made by means of the motor-blower unit, B. Thus the air is withdrawn from the tube coming from the mouthpiece by means of the blower and is forced through the soda-lime in the container, A. When free from carbon dioxide the air passes through the pipe, c, and is inhaled by the lungs. This pipe, c, is of large calibre and the air is at atmospheric pressure, so that there is no measurable effort on the part of the lungs to secure a very large ventilation of air. The mouthpiece holder is provided with a side tube, a, fitted with a rubber stopper at the lower end, to collect saliva during the period of work.

The volume of oxygen introduced is measured not by the pump, but by an excellent so-called "1/20 cubic foot, wet-test gas meter," D, of the American Meter Company, with dials graduated in liters.* This we can recommend highly. The safety bottle, E, at the left indicates immediately the rate of flow and provides protection against any sudden rush of gas. The actual amount of time required for the consumption of successive portions of 1 liter each as read on the meter, is noted on a watch by exactly the same procedure as that outlined in the foregoing paragraphs, that is, waiting until the index button on top of the bathing cap just fails to touch the indicator at the top.

The meter is very accurate and the saturation of the oxygen by water vapor in the safety bottle prevents any change in level of the water in the meter. The meter is best calibrated by the method of admitting a known weight of oxygen[14]. The apparent volume of oxygen admitted to the meter is subsequently reduced to 0°C. and 760 mm., assuming that the gas leaves the meter saturated at the temperature of the meter.

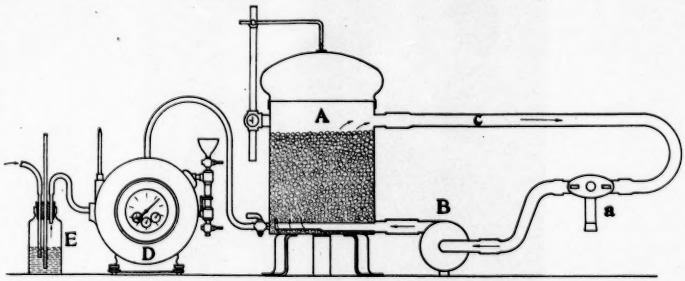

FIG. 9. Respiration apparatus for continuous, severe stationary work.

The expired air is forced by the blower, B, through the soda-lime in the can, A, and back again to the mouthpiece through the pipe, c. The mouthpiece is provided with a side tube, a, for the collection of saliva. The oxygen introduced is measured by the gas meter, D, provided with safety bottle, E.

The apparatus is admirably adapted for the work of stationary bicycle riding and for walking on a treadmill.† The rapidity with which results can be obtained, checked, and repeated makes the apparatus very useful.

COMPARISON OF OPEN-CIRCUIT AND CLOSED-CIRCUIT RESPIRATION APPARATUS

The long experience of the Nutrition Laboratory with practically all types of respiratory exchange experiments has led to frequent queries from physicians, physiologists, and experimenters in general as to what type of apparatus is to be recommended for various purposes. It seems best, therefore, at this juncture to discuss some of our experiences with the two different

*Manufactured by D. McDonald and Company, 991 Broadway, Albany, New York.

†By substituting an external soda-lime container and a 6- or 9-liter spirometer, graphic tracings of the mechanics of respiration may be made.

general principles of respiration apparatus, i. e., the open-circuit and the closed-circuit plans.

The oldest form, the open-circuit apparatus, requires a supply of pure, uncontaminated, outdoor air, suitable mouthpiece, face mask, or nosepiece, inspiratory and expiratory valves, an apparatus for measuring the total amount of expired air, a good gas-analysis apparatus, and, above everything else, a well-trained gas analyst. This type of apparatus gives a very complete picture of the gaseous exchange, but its greatest advantage lies in the fact that by its use one can approximate the probable respiratory quotient.*

The open-circuit apparatus requires rather lengthy preliminary preparation, gas sampling, gas analysis, and time-consuming computations. Moreover, unless one employs the very complicated technique of Tissot for graphic registration of the respiratory movements, no idea of the mechanics of respiration is available other than what can be obtained ordinarily by a chest pneumograph. The fact, however, that the apparatus does permit the use of a mask, either a half-face mask or a complete mask (such as the war gas mask), possibly in many instances makes for somewhat more normal respiration than does either the mouthpiece or nosepiece. It is furthermore to be stated that of the several hundred metabolism measurements made each day in the United States by means of this method, probably the main purpose, if not indeed the only purpose, is to determine the total metabolism and, as Hendry, Carpenter, and Emmes have pointed out[17], for such a purpose it is an economic waste to attempt any other measurement than that of the oxygen absorption. Only in those cases where knowledge with regard to the respiratory quotient is desired is the determination of the carbon-dioxide increment necessary. Unfortunately, however, by the gas-analysis method, where an alkaline absorbent for oxygen is employed, before the oxygen deficit can be determined all the carbon dioxide must be removed from the gas sample.

It would appear therefore as if in the majority of cases the determination of the respiratory exchange by this open-circuit method, involving delicate gas analysis, could be supplanted by the simple determination of the oxygen consumption, from which the heat production may be computed by applying the average calorific value of oxygen. It is true that when the respiratory quotient is determined, the calorific value of oxygen (instead of being assumed to be on the average 4.825 calories per liter) may be more closely approximated, since there are slight variations in the calorific value of oxygen with differences in the respiratory quotient.

For studies of the respiratory quotient, the open-circuit method is essential. The technical and physiological difficulties in securing perfectly normal respiration with *any* form of breathing appliance must be fairly recognized, although a large number of individuals, particularly those well-trained in physiological research, may become so accustomed to the breathing appliance as to give results that are perfectly comparable, if not, indeed, absolutely normal. There are, however, many physiologists who believe that the disturbance of respiration caused by the insertion of a mouthpiece or the attachment of a face mask is such as to make of physiological value only those respiratory quotients obtained when the subject is inside a respiration chamber, with perfectly free, untrammelled breathing.

The closed-circuit apparatus presents an entirely different picture. It usually determines only the oxygen consumption. There are methods, to be sure, at present proposed to secure the respiratory quotient by this means, the most promising of which is apparently the ingenious device of Hagedorn[18]. It still remains a fact, however, that no such use of the closed-circuit apparatus is made in America.

In the closed-circuit apparatus, by connecting the subject with the apparatus by means of the mouthpiece and connecting the kymograph with the pointer on the counterweight of the spirometer, the respiratory movements can immediately be graphically traced. From this tracing the total ventilation of the lungs may later be computed by means of a map measurer or by summing the heights of the peaks of the respirations. In fact, a work-adder wheel device has been most successfully used for this purpose by H. Monmouth Smith[19] with the universal respiration apparatus. From the graphic tracings of the respiratory movements one can tell instantly if the subject is drowsy or sleepy or has been breathing abnormally. If there is rebreathing, due either to defective ventilation or incomplete removal of carbon dioxide, it is almost immediately shown on the tracing. The apparatus does not give the respiratory quotient, but, as pointed out above, the respiratory quotient is very rarely used in experiments in which knowledge only of the total metabolism is desired.

The consumption of oxygen is rapidly determined with the closed-circuit apparatus by noting the general slope of the line drawn through the graphic tracing in relation to the base line or time line. The data required for computing the oxygen consumption are the actual fall of the spirometer bell and the time. Both of these important factors are indelibly recorded on the graphic tracing; only the barometric pressure and temperature are lacking. The temperature of the bell, with a system such as is shown in figure 1 (page 809) rarely changes appreciably. Of the three temperatures commonly recorded (that of the barometer, that of the room, and that of the spirometer bell) it is highly improbable that all three would be overlooked, and one could always obtain from the protocols the

*A more complete discussion of this point has been given by Carpenter[15] and by Krogh and Lindhard[16].

probable temperature obtaining in the bell in case that particular reading were omitted. Thus practically all the essential data are recorded, with the personal equation minimized.

A significant feature in the use of the closed-circuit apparatus, particularly when the cylindrical bell and the external blower and external soda-lime bottle are used (as outlined in figure 1), is the test for leaks. In the open-circuit apparatus the mask and the apparatus can be tested for leaks *before* the experiment and *after* the experiment, but when the apparatus is connected with the subject, it cannot be tested at that moment when it is most important to know that the connections are perfect, that is, actually *during* the experiment.

With the apparatus shown in figure 1 the test for the absence of leaks *during* a respiration experiment is rapidly made and permanently recorded in the following way. At the end of 3, 4, or 5 minutes, i. e., about midway through the proposed experimental period, the operator places on top of the spirometer bell a 35-gram weight, such as a rubber stopper or a pinchcock. If there is a leak equivalent to a pinhole anywhere in the apparatus or connections or about the mouth or nose, this added weight on the spirometer bell will instantly change the general slope of the graphic tracing, indicating a more rapid increase in the fall of the bell. The moment such a change of slope in the line is observed, the operator stops the experiment, removes the mouthpiece, disregards all of the data, and begins anew, thus saving much time and the possibility of introducing unknown errors.

The apparatus shown in figure 1 is not recommended for the determination of the respiratory quotient. The newer types of closed-circuit apparatus suggested for this purpose do not, it is believed, wholly overcome the general objections to the determination of the respiratory quotient under any conditions other than in the respiration chamber. It is, however, a distinct defect that this apparatus does not give the respiratory quotient, and we would suggest that in all cases where two basal metabolism measurements are made (and no conclusions should be based upon one determination) it would be best to carry out the first period on the closed-circuit apparatus and the second period on the open-circuit apparatus. By this means the duplicate experiment has the advantage of serving as a check upon the first measurement of the oxygen consumption and gives an approximation or a suggestion as to the probable respiratory quotient. Furthermore, by thus determining the basal metabolism on two totally different forms of apparatus, one can be certain that, if the results agree with each other, no systematic error exists. Insurance of accuracy is not guaranteed by two closely agreeing gas analyses. The collection of gas in a 50-liter spirometer and the reading of its volume are likewise open to error, particularly in the personal equation of the operator. There is a false sense of security in arguing that, because one has made two closely agreeing gas analyses, the basal metabolism is accurately measured.

Obviously these recommendations are entirely independent of the control of the apparatus by alcohol check tests.

The closed-circuit apparatus, however, does not lend itself satisfactorily to the use of any other breathing appliance than the mouthpiece or, perhaps, the nosepiece. While Dr. Carpenter[20] has successfully employed the half-face mask and Professor Miles has employed the whole war gas mask[31] in this Laboratory, in general we believe that this procedure is dangerous in the hands of the inexpert. The ability to test the apparatus in the middle of the period by placing on the weight does make it always possible to rule out leaks, but leaks are so frequently observed with any form of mask that much time is lost, unless one has an especially coöperative subject. A great disadvantage in the use of the mask is the long delay caused by the extreme care necessary to secure tight closure by means of innumerable bands, pads, straps, and tapes. The mouthpiece can be inserted in an instant, the nose-clip added, and it is very rarely that a leak is found with this breathing appliance.

The evidence thus far accumulated suggests that for the determination of the respiratory quotient the most normal breathing is essential. This is probably to be found only in some type of apparatus where breathing appliances are not used. Such an apparatus is of the chamber type.

AN OPEN-CIRCUIT ARRANGEMENT FOR THE VENTILATION OF RESPIRATION CHAMBERS*

To determine the gaseous metabolism of humans inside of a respiration chamber, including the carbon-dioxide production, the oxygen consumption, and, indeed, the water vaporized, one may have recourse to either the older open-circuit device of Pettenkofer and Voit[21], which determines only the carbon-dioxide production, or the closed-circuit scheme of Regnault and Reiset[22], perfected in the chemical laboratory of Wesleyan University, Middletown, Connecticut, by Atwater and his associates[23]. For small animals the ingenious method of Haldane[24], including the weighing of the chamber and the animal, has been most successfully employed. In addition to these three generally used methods, Hasselbalch[25] in Copenhagen and Jaquet[26] in Basel at the same time applied an exact gas-analysis apparatus to the analysis of air entering and leaving the respiration chamber, metered the outgoing air, and computed

*This principle, which has proved most satisfactory in the Nutrition Laboratory, has, on our recommendation, been adopted recently by Dr. Fritz B. Talbot at the Massachusetts General Hospital in Boston.

therefrom the total carbon-dioxide production and oxygen consumption.

The Nutrition Laboratory has for years confined its gaseous metabolism technique almost exclusively to the closed circuit. The difficulties of securing an exact gas-analysis apparatus, such as is essential for the Hasselbalch-Jaquet scheme, have precluded its general use. The recent development of such an apparatus by Dr. T. M. Carpenter[27] of the Nutrition Laboratory made feasible the application of this delicate gas analysis to the ventilating air current of the respiration chamber, and the Nutrition Laboratory has proceeded sufficiently with its experiments in that line to give up entirely the closed-circuit principle in its respiration chambers, for both man and animals.

In the open-circuit respiration chamber now in use in the Nutrition Laboratory, dry, uncontaminated, outdoor air is supplied to the chamber just as fast as it is withdrawn. The total amount of water vapor and particularly the amount of carbon dioxide in the outgoing air are quantitatively absorbed in suitable reagent vessels. The amount of carbon dioxide thus absorbed is corrected by deducting the amount apportioned to the ingoing air. The residual amounts of water vapor and carbon dioxide in the chamber are determined, the first by a psychrometer, the second by analysis of the outgoing air in a precise gas-analysis apparatus. The oxygen deficit in the ventilating air current is simultaneously determined. One gas analysis therefore shows the percentage of carbon dioxide in the residual air and the carbon-dioxide increment and oxygen deficit in the ventilating air current, from which is readily calculated the respiratory quotient. Knowing the total weight of carbon dioxide collected in the absorbing vessels, the amount of carbon dioxide entering the chamber with the outdoor air, and the changes in the residual carbon dioxide in the chamber, one may determine the true total carbon-dioxide excretion of the subject in any period and from this value and the respiratory quotient one may compute the oxygen absorbed in the same period. Thus, the determinations depend upon the absorption of the total amount of carbon dioxide in the air current, the analysis of the air current, and the calculation of the amount of carbon dioxide in the air entering the chamber.

A schematic outline of the complete circuit is given in figure 10. Uncontaminated outdoor air enters the suction side of a positive blower, A. It is freed from water vapor by forcing it through concentrated sulphuric acid in two large vessels*, B_1 and B_2, followed by a small Williams bottle, C. By weighing the Williams bottle from week to week the efficiency of the drying process is assured, for the Williams bottle will remove all water vapor until it has gained in weight 8 grams. In this case it is used solely as a check on the larger vessels, B_1 and B_2, and rarely has to be changed. As the air passes through the concentrated sulphuric acid at the rate of 20 to 30 liters per minute, a slight unweighable acid fume is added to the air current which, unless removed by a scrubber, would enter the respiration chamber and irritate the respiratory tract of the subject. The scrubber, D, is a metal can loosely filled with cotton batting and powdered sodium bicarbonate. Thus, a slight excess of uncontaminated, outdoor air, freed from water vapor but containing the normal amount of carbon dioxide (0.03 per cent), is brought to the intake pipe of the respiration chamber, and the slight excess is allowed to flow out of an upright pipe with valve, e, into the air of the laboratory room.

The respiration chamber may be any size. In figure 10 it is shown somewhat reduced in size. For adult humans the Nutrition Laboratory is using a cylindrical chamber, 70 cm. in internal diameter and 200 cm. long, with a volume of approximately 785 liters. A delicate petroleum arc manometer, f, indicates the pressure inside the chamber at all times.

The air leaving the respiration chamber is withdrawn by a positive blower, E, and passes first over a dry-bulb and then a wet-bulb thermometer. This form of psychrometer is directly in the ventilating air current. A rapid blast of air is constantly playing over both bulbs. The thermometers can be read to 0.01° C. The amount of distilled water vaporized from the wet bulb in any period is found by raising the burette until the level of water in the narrow calibre, glass reservoir, g, is the same as at the start, and then reading the difference in the water level in the burette.

The air then enters the suction side of the blower, E, and after passing through an empty bottle, F, which serves as a trap to protect the blower in case of back pressure of sulphuric acid, it is forced through a chain of absorbing vessels. The first two vessels are standard Williams bottles, G_1 and G_2, containing sulphuric acid to absorb the water vapor. The next is a soda-lime bottle, H, to absorb the carbon dioxide, and finally there is a sulphuric-acid bottle, J, to absorb the traces of moisture given up to the air current by the soda-lime in H. After leaving the sulphuric-acid bottle, the air passes through a can, K, containing cotton batting and dry sodium bicarbonate, and then through two ordinary, 3-light gas meters, M_1 and M_2, preferably with dials reading in liters. From the meters the air is discharged into the room, a thermometer in the discharge pipe indicating its temperature.

By weighing the Williams bottles, G_1 and G_2, the weight of water absorbed is known. The increase in weight of the bottles H and J represents the weight of carbon dioxide absorbed

*Porcelain vessels originally described by Benedict and Carpenter[28]. Large Woulff bottles are equally serviceable.

during the experimental period, which is usually 30 minutes long.

Although but one set of absorbing vessels is shown in figure 10, if 2-way plug cocks are inserted in the pipes just as the air enters G_1 and just after it leaves J, a second set of Williams bottles and soda-lime bottle can be supplied, and when these two cocks are turned simultaneously, the total air current can be deflected into a second previously weighed set of absorbers. The experimental periods can thus be of any desired duration. The mercury control of the completeness of absorption of carbon dioxide is obtained by allowing the air to bubble through a solution of barium hydroxide in the flask, a. When the petcock, b, is opened, air will usually bubble through the liquid in a, if not too deep a layer is used. If the orifice on the meter M_2 is partially closed by the thumb, enough pressure will be built up to insure the bubbling of the air through the barium hydroxide. If unabsorbed carbon dioxide is present, barium carbonate will be immediately precipitated.

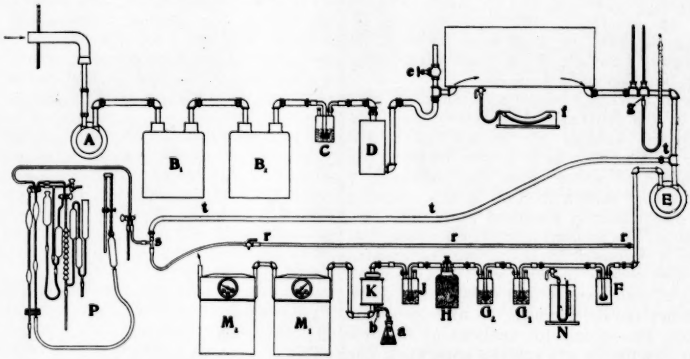

FIG. 10. Open-circuit respiration calorimeter.

Blower, A, forces outdoor air through sulphuric acid in can, D, and then into the respiration chamber, the excess air escaping through the valve, e. Blower, E, withdraws air from the chamber over a psychrometer with glass reservoir, g, and then passes it through the trap, F, the sulphuric-acid vessels, G_1 and G_2, the soda-lime bottle, H, the sulphuric-acid bottle, J, and the sodium-bicarbonate can, K. The air finally passes through the two meters, M_1 and M_2, and is discharged into the laboratory room. N is a mercury manometer, f is a petroleum arc manometer, and a is a flask containing barium hydroxide to control the completeness of absorption of carbon dioxide in the air by opening petcock b. The air leaving the chamber is forced along the pipe r, r, r, and passes by the end of the gas-analysis apparatus, P, at s. The large pipe t, t, t, prevents high pressure at the point of sampling.

manometer, N, indicates any appreciable change in resistance in the two sets of absorbing vessels and aids in controlling the rate of ventilation. Obviously the rate of withdrawal of air from the chamber must be exactly that of the rate of supply. By-passes on blowers A and E make such control easy.

Control of the completeness of absorption of water vapor is found in the increases in weight of the Williams bottles, C, G_2 and J. They should not have gained 7 grams at the beginning of a proposed period, if the further gain is liable to be 3 grams. For any amount under 10 grams complete absorption is assured.* The

The circuit, as thus far outlined, enables the determination of (a) the *total* amount of carbon dioxide in the air leaving the respiration chamber, as absorbed and weighed in the bottles H and J; (b) the relative humidity of the air leaving the chamber, and, presumably, the average relative humidity of the air inside the chamber at the moment of reading the wet-bulb and dry-bulb thermometers; (c) the total amount of water vapor leaving the chamber, plus a small amount vaporized from the wet-bulb thermometer; and (d) the approximate total volume of air leaving the chamber, as read on meters M_1 and M_2.

The air entering the chamber is of definite, known composition, that is, it is water free and contains 0.03 per cent of carbon dioxide, 20.94 per cent of oxygen, and 79.03 per cent of nitrogen[29]. The changes in the composition of the air due to the processes of metabolism are meas-

*The appearance of patented soda-limes on the market has been a mixed blessing to workers in metabolism. Unquestionably certain soda-limes rather high in moisture and low in alkali have a distinct place in metabolism work, particularly in those forms of apparatus where the carbon dioxide eliminated is not to be measured quantitatively. The high amount of moisture in these soda-limes makes it wholly impractical to use them in an absorbing circuit, when the soda-lime container is to be followed by a weighed sulphuric-acid bottle (the ordinary Williams bottle). According to a rule in the Nutrition Laboratory, the Williams bottle should not have gained in weight *prior* to the beginning of the experimental period so much that the *probable* absorption during the proposed period will bring the total absorption above 10 grams. The bottle cannot be relied upon to absorb all the water vapor from the air current after it has gained 10 grams. It is our custom to change these bottles usually after they have absorbed 7 grams. With soda-lime having a high moisture content this point is passed very rapidly. At least two laboratories have lost a great deal of experimental work as a result of employing patented soda-lime in the absorption system. The Nutrition Laboratory knows of only one soda-lime that will serve the purpose, i. e., that prepared by the modified formula of Haldane[2]. If this soda-lime is specified, it can be obtained from several sources.

ured by the absorption of the total amount of carbon dioxide and by analyses of the air current from time to time. These analyses are carried out on the delicate gas-analysis apparatus of Carpenter[27], which is shown in outline at P in figure 10. The air leaving the chamber is forced at a point of high pressure between the blower and the absorbing system along the small pipe, r, r, r, and is caused to pass by the end of the gas-analysis apparatus at s. As a high pressure at the point of sampling is disadvantageous, a pipe t, t, t, of large calibre (20 mm., internal diameter) carries the air back to the suction side of the blower. In this pipe a very slight pressure prevails.

To control the gas-analysis apparatus, analyses of outdoor air are frequently made. Connection (not shown in figure 10) between the gas-analysis apparatus and the incoming air pipe, just before it enters blower A, facilitates such control.

Determination of the carbon-dioxide production. All of the carbon dioxide leaving the respiration chamber is absorbed by the soda-lime in the bottle H. Some of this is obviously that entering the chamber in the outdoor air. The percentage (0.03) of carbon dioxide in outdoor air is known. The volume of air passing through the chamber is known with a sufficient degree of accuracy by reading the two dry gas meters. The reason for having two meters is that while these inexpensive gas meters are extraordinarily rugged and almost never fail to indicate the amount of gas passing through, there is always a possibility of error in reading and the readings on the two gas meters should be in very close agreement all the time. The temperature and the barometric pressure are recorded. A meter factor may be determined either by comparing these meters with a well-tested wet meter or by the usual method of admitting a weighed amount of oxygen[14]. The calculation of the amount of carbon dioxide absorbed in the soda-lime bottle attributable to that entering the chamber with the ingoing air is obtained by multiplying the reduced volume of air, as read on the meters, by 0.03 per cent, and converting the volume thus obtained to grams. This amount is deducted from the total amount weighed in the soda-lime bottle, and the remainder is the amount of carbon dioxide exhaled by the subject. This is not the true amount however, for a final correction is necessary for any change in the carbon dioxide residual in the chamber. This change in the residual carbon dioxide is found from the gas analyses made on the Carpenter apparatus, for the percentage of carbon dioxide in the air leaving the chamber may be assumed to be that of the air in the chamber. Multiplication of the percentage of carbon dioxide by the volume of the chamber gives the residual carbon dioxide in liters, and this volume is likewise converted to grams. The amount of carbon dioxide weighed in the soda-lime bottle, H, and its following sulphuric acid bottle, J, is therefore corrected by deducting the amount of carbon dioxide in the ingoing air and is further corrected for any gain or loss of carbon dioxide inside the chamber during the period. The final amount, as a result of these two corrections, represents the true excretion of carbon dioxide by the subject.

Determination of the oxygen consumption. The determination of the oxygen consumption is an entirely different procedure. The air leaving the chamber can be looked upon as pure, uncontaminated outdoor air, chemically altered in composition by the metabolic processes going on in the body of the subject. Consequently, if the carbon-dioxide increment and the oxygen deficit in this air are determined on the Carpenter gas-analysis apparatus, the calculation of the respiratory quotient is very simple. Knowing the respiratory quotient, one has but to refer to the total volume of carbon dioxide produced by the man and from the respiratory quotient may immediately compute the corresponding volume of oxygen consumed. It is seen that this apparatus differs from the Hasselbalch-Jaquet method in that an accurately calibrated meter is not used for metering the outgoing air. Thus the accuracy of this measurement is not taken into consideration, for all the carbon dioxide is weighed. Furthermore, the amount of carbon dioxide is wholly absorbed, leaving out any error in aliquoting or in gas analysis.

Respiratory quotient. For respiration chambers it is believed that this open-circuit arrangement is the ideal method, since it enables the determination of the respiratory quotient as frequently as the gas analyst can make the analyses, or dry samples can be taken over mercury and analyzed subsequently and, indeed, as frequently as desired. For the best study of the respiratory quotient it is obvious that the smaller the volume of extraneous air in the chamber the better, for the lag or sluggishness of change in the large volume of air in the chamber is thus reduced to a minimum. While a mouthpiece, mask, or a nosepiece would theoretically reduce this volume to that of the lungs, there are serious objections to the use of these attached appliances in a careful study of respiratory quotients, owing to the tendency for such appliances to modify (unnoticed in many cases) the type of respiration. On the other hand, when muscular work is being performed and the production of carbon dioxide and the consumption of oxygen are large, the volume of the chamber plays a smaller role. It is more than likely that some device like the very clever head chamber of Grafe[30] will ultimately prove to be far better than placing the entire subject inside of a respiration chamber, although the necessary constriction around the neck for closing such a head chamber may have an influence upon the mechanics of respiration and one should not assume, without actual demonstration, that this influence does not exist. In the Nutrition Lab-

oratory gas analyses thus far have been made only once during each half-hour period, since the changes in the respiratory quotient are usually rather slow. In experiments where rapid changes are expected, however, samples can be taken at any time, provided they are taken dry and retained over mercury, and can be subsequently analyzed.

Determination of the water. The water vapor leaving the respiration chamber is quantitatively absorbed by the sulphuric-acid vessels, G_1 and G_2. In addition there is absorbed a small amount of water vaporized from the wet-bulb thermometer, which may be directly read upon the leveling burette, as outlined above. The computation of the changes in the residual water vapor inside the chamber is based entirely upon the psychrometric readings and the reduction tables. By this means any changes in the water vaporized inside the chamber are readily taken into account in the final calculations.

Calibration of the apparatus. As is customary with all types of apparatus in the Nutrition Laboratory, each new form or modification of an old form must undergo alcohol check tests. By using the mechanico-chemical device previously described[10], which slowly raises a burette supplying alcohol to a lamp inside the respiration chamber, quantitative control measurements may be most satisfactorily made. From the density and the chemical composition of alcohol not only the carbon dioxide produced in the combustion of 1 c.c. of the liquid but likewise the oxygen involved in the combustion, the water vapor produced, and, indeed, the heat developed may be accurately known. In this new apparatus, in which, as a matter of fact, the respiration chamber is provided with calorimetric devices, all four factors, carbon-dioxide production, oxygen consumption, water production, and heat production, are measured. In spite of the fact that there is a minimum amount of hygroscopic material inside of the respiration chamber, the difficulty of securing uniform conditions of moisture inside of the chamber at the beginning and end of the experiment is always present, and it is only after very long-continued ventilation and extremely regular alcohol combustion that one can even approximate quantitative figures for the water. On the other hand, the carbon dioxide produced by the alcohol and absorbed by the soda-lime, corrected for the carbon dioxide of the incoming air and any change in the amount residual in the chamber, is usually very close to the theoretical amount. Likewise the respiratory quotients, as determined on the Carpenter gas-analysis apparatus, usually lie very close to the theoretical value.

Calorimetric features. The calorimetric features of the apparatus are not here discussed or described.

ADVANTAGES OF THE MODIFIED OPEN-CIRCUIT APPARATUS

Practical experience has shown numerous advantages of this modified open-circuit arrangement, but perhaps the most important advantage from the practical standpoint is the elimination of the time-consuming closure of the respiration chamber of large size. In the closed-circuit apparatus a leak even as large as a pinhole is disastrous, and the window or door must be waxed in and closed without the possibility of any leak whatsoever. In the Nutrition Laboratory respiration chamber for man the door or front opening is, as is common with respiration apparatus of this type, closed with wax. Undoubtedly a metal frame with rubber gasket and clamps would serve the purpose perfectly, for with the open-circuit arrangement a leak into or out of the chamber, unless of great magnitude, would be of little, if any, significance. In the closed-circuit apparatus a leak into or out of the chamber of 1 liter of air in 1 hour would mean an error of 16 c.c. per minute in the measurement of the *oxygen consumption* of a man. In the modified system a permanent leak into the chamber of 1 liter of air per hour would have the effect only of bringing into the chamber a few milligrams of water vapor that existed in the air of the room or laboratory and was not present in the air furnished to the chamber by the purifying system. The slight difference in the percentage of carbon dioxide in ordinary laboratory air (which may be as high as 0.08 per cent) and that of outdoor air (0.03 per cent) would be wholly insignificant in a leak of the magnitude of 1 liter per hour. On the other hand, a leak *out* of the chamber of 1 liter of air per hour would simply mean that 1 liter of air containing about 0.6 per cent of carbon dioxide would escape into the air of the laboratory, carrying with it 6 c.c. of carbon dioxide which therefore escapes absorption in the absorbing vessels, and there might thus be an error of 0.1 c.c. per minute in the carbon-dioxide determination.

While every effort is made to secure a tight closure about the door (using, as always, universal wax), a process that formerly required from 20 to 30 minutes with a hot soldering iron and most careful, minute inspection by at least two people is now carried out by one person in a few minutes, with perfect satisfaction. Furthermore, with the aid of the delicate petroleum manometer, f, attached to the chamber, atmospheric pressure is maintained inside the chamber. Under these conditions the matter of leaks can be completely disregarded, an advantage which only those who have worked with the closed-circuit apparatus can appreciate.

Determinations of the respiratory quotient may be made as frequently as the gas-analysis technique will permit, usually each half hour. The storage of samples over dry mercury

makes possible innumerable collections which may subsequently be analyzed without error and thus offers a complete picture of the changes in the respiratory quotient as time goes on.

SUMMARY

The constant use of various types of respiration apparatus in the Nutrition Laboratory has resulted in the improvement of already existing techniques and the development of new techniques. A modified form of the Benedict-Collins respiration apparatus with external blower and soda-lime container and with the spirometer not in the direct circulation of air is recommended for most exact physiological experimenting. A small, modified form of the student respiration apparatus, light enough in weight to be easily carried in the hand, has been developed for use chiefly in walking experiments, although control tests have proved that it also measures the metabolism accurately under conditions of rest. An air pump is employed with this apparatus to meter the oxygen absorbed. For experiments involving rather severe work this apparatus has been placed upon a light-weight knapsack and is attached to the back. The air pump in this case is replaced by two basket-ball bladders filled with oxygen. Another modified form of the student apparatus permits the measurement of the metabolism during continuous, severe stationary work.

The long experience of the Nutrition Laboratory in the use of both closed-circuit and open-circuit apparatus and the development of the Carpenter gas-analysis apparatus have led to the use of an open-circuit arrangement for the ventilation of respiration chambers. A calorimetric chamber with the open-circuit arrangement is at present being employed very successfully for simultaneous measurements of the carbon-dioxide production, the oxygen consumption, the heat production, and the water vaporized. The open-circuit arrangement has the advantage of permitting easy and quick closure of the chamber, with complete disregard of the matter of leaks.

All of these modified types of apparatus have been proved to be accurate, in alcohol check tests with a mechanico-chemical device.

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The Massachusetts Medical Society

PROCEEDINGS OF THE COUNCIL

STATED MEETING, OCTOBER 7, 1925

A STATED MEETING of the Council was held in John Ware Hall, Boston Medical Library, Wednesday, October 7, 1925, at 12 o'clock, noon. The President, Dr. James S. Stone, was in the chair and the following 120 Councilors present:

BARNSTABLE
W. D. Kinney

BERKSHIRE
Henry Colt
A. P. Merrill

BRISTOL NORTH
W. H. Allen
W. O. Hewett

BRISTOL SOUTH
E. F. Curry
E. F. Cody
W. A. Nield
I. N. Tilden

ESSEX NORTH
R. C. Hurd
E. S. Bagnall
J. Forrest Burnham
W. W. Ferrin
G. E. Kurth
F. S. Smith
F. W. Snow

ESSEX SOUTH
J. F. Donaldson
J. A. Bedard
J. F. Jordan
J. W. Trask
F. W. Baldwin
W. T. Hopkins
P. P. Johnson
W. G. Phippen
R. E. Stone

FRANKLIN
B. P. Croft
G. P. Twitchell

HAMPDEN
W. C. Leary
G. D. Henderson
J. P. Schneider

MIDDLESEX EAST
Richard Dutton
H. A. Gale
A. E. Small

MIDDLESEX NORTH
J. F. Boyle
A. R. Gardner
W. B. Jackson
J. A. Mehan
T. A. Stamas

MIDDLESEX SOUTH
G. L. West
E. H. Bigelow
W. H. Crosby

D. F. Cummings
James Glass
L. H. Jack
H. J. Keaney
Edward Mellus
C. E. Mongan
J. P. Nelligan
W. A. Putnam
L. H. Raymond
C. H. Staples
E. H. Stevens
A. K. Stone
H. W. Thayer

NORFOLK
D. N. Blakely
G. G. Bulfinch
W. L. Burrage
P. W. Carr
Samuel Crowell
O. G. Daniels
D. G. Eldridge
C. S. Francis
Maurice Gerstein
Harry Goldman
A. H. Hodgdon
G. W. Kaan
C. J. Kickham
J. S. H. Leard
E. N. Libby
J. S. May
S. F. McKeen
T. J. Murphy
M. V. Pierce
Harriet E. Rogers
Victor Safford
H. F. R. Watts

NORFOLK SOUTH
C. S. Adams
C. A. Sullivan
D. A. Bruce

PLYMOUTH
J. H. Drohan
J. E. Bacon
T. H. McCarthy
J. P. Shaw

SUFFOLK
C. M. Smith
J. W. Bartol
David Cheever
A. L. Chute
A. H. Crosbie
R. L. De Normandie
W. H. Ensworth
R. B. Greenough
J. C. Hubbard
E. P. Joslin
G. A. Leland, Jr.
Donald Macomber
G. B. Magrath
J. H. Means
T. J. O'Brien
R. B. Osgood
Alexander Quackenboss
John Rock
Jane D. K. Sabine
J. J. Skirball
J. S. Stone
R. H. Vose

WORCESTER
W. P. Bowers
L. R. Bragg
G. A. Dix
D. E. Emery
J. J. Goodwin
R. W. Greene
David Harrower
E. L. Hunt
A. G. Hurd
A. W. Marsh
F. H. Washburn
S. B. Woodward

WORCESTER NORTH
W. E. Currier
A. F. Lowell
H. R. Nye

The President stated that a reprint of the Proceedings of the Council, June 9, 1925, had been sent to every councilor with the notice of this meeting; he called for any errors or omissions that had been noted. There being none it was moved and seconded that the minutes of the last meeting be accepted as printed, and it was so voted. He stated that he had attended a meeting of the four western districts of the Society at Belchertown where the proposition to hold the next annual meeting at Springfield had been enthusiastically received. He asked the Secretary to read the invitation of the Hampden District, voted on that occasion, and the following was read:

"Springfield, September 16, 1925.

Dr. Walter L. Burrage,
Secretary the Massachusetts Medical Society.

Dear Dr. Burrage:

At a meeting of the Hampden District Medical Society, held September 15, at Belchertown, it was unanimously voted that this District extend to the Massachusetts Medical Society an invitation to hold its next annual meeting in Springfield.

Springfield has not had the honor of entertaining the Massachusetts Medical Society for a great many years. The members of the Hampden District sincerely hope that their invitation will be accepted.

With kindest regards

HERVEY L. SMITH,
Secretary, Hampden District."

On motion by Dr. W. P. Bowers the invitation was accepted by a unanimous vote. Dr. W. C. Leary, President of the Hampden District, said that he was very glad the Society had decided to meet in Springfield and that the Fellows of his district would endeavor to make the meeting so successful that the Society would want to come again. Dr. John Rock read this report of the Committee of Arrangements; and it was accepted by vote:

REPORT OF COMMITTEE OF ARRANGEMENTS

If you decide to hold the next annual meeting in Springfield, it will simplify arrangements considerably and go far to insure a successful meeting if you will authorize the President to appoint three more members to serve for one year on the Committee of Arrangements, it being understood that these men shall reside in Springfield or its environs, and will act as a local Committee of Arrangements.

May we also ask for instructions regarding exhibits, either scientific or commercial, or both, during the Convention? Suitable scientific exhibits are scarce in any one State—we might gather a few. For a commercial exhibit the drug, publishing, and apparatus houses will probably be glad of a chance to advertise if you think it is worth while. It means the expenditure of considerable energy, but not much more.

You will be pleased to learn that plans have been made with the six various sections, each to put on a program lasting two or three hours. This means that meetings of two, sometimes three, sections will be held at one time. To avoid confusion and to permit members to obtain the optimum from the meeting, each of these sections has been assigned one definite hour for the main speaker of the section—an hour which does not conflict with the hour assigned for this purpose to any other section. We have tried also to group the six sections in the three available half days to contrast as much as possible in subject matter, so that each member's interest may not be attracted in too many ways at once.

Judging by the meeting in Pittsfield in 1923, and that in Swampscott in 1924, it is fair to expect the meeting in Springfield to be well attended. We will make it worth while, and will appreciate any missionary work done by the members of the Council, each in his own district.

Respectfully submitted,
JOHN ROCK, *Chairman.*

In accordance with the recommendation of the report it was voted that the President appoint a local committee of arrangements. He appointed Dr. W. C. Leary, Dr. H. L. Smith and Dr. J. M. Birnie. On motion, duly seconded it was voted to hold both scientific and commercial exhibits in connection with the Springfield meeting.

Dr. T. J. O'Brien presented a report of the Joint Committee on State and National Legis-

lation. It was accepted and the President said that the committee needed the help of every Fellow of the Society in order to carry through the recommendations.

REPORT OF JOINT COMMITTEE ON STATE AND NATIONAL LEGISLATION

Your Committee on State and National Legislation joined the Committee representing the Massachusetts Homeopathic Medical Society, as has been our custom for several years, in order to place our policies before the greatest number of physicians.

The Joint Committee reviewed the bills which had been introduced in the Legislature for the past few years, and felt that nothing constructive had been accomplished. We felt that the support of the public was required to properly emphasize to the members of the Legislature the need of the proposed changes. This interest of the public must be obtained by instruction on the part of the family physician.

It was *Voted*, That the President of the Massachusetts Medical Society be authorized to prepare a brief expressing our views on proposed bills, and: That copies of said brief be sent to certain physicians, that they may be supplied with the same data to be used in addressing clubs throughout Massachusetts: That the various Rotary, Kiwanis and Women's Clubs, as well as Chambers of Commerce and fraternal orders, be addressed by members of our Society in a systematic manner.

It was agreed, that there should be one standard for the qualification of fitness to practice medicine in this State; that the present restriction concerning membership in medical societies which now compels the Governor to appoint three members of the Massachusetts Homeopathic Society and one osteopath to the Board of Registration in Medicine be removed; and that some acceptable method be devised for passing upon the standards of all medical schools in this Commonwealth.

Respectfully submitted,

THOMAS J. O'BRIEN, *Secretary*.

In the absence of the chairman Dr. R. B. Osgood read a report of the Committee on Publications and Scientific Papers. It was accepted without discussion.

REPORT OF COMMITTEE ON PUBLICATIONS AND SCIENTIFIC PAPERS

The Committee on Publications and Scientific Papers beg leave to submit the following report:

The fall meeting of the Committee on Publications and Scientific Papers was held on September 24. The matters chiefly under discussion were the publication by the Society of the very thorough and complete review of The Communicable Diseases Prevalent in Massachusetts by Major E. G. Huber and the article on Health Examinations by Dr. Joseph Garland. These matters had been referred to the Committee with authority as to their publication by the Society, last June, with the request that suggestions as to the method of publication be made and referred to the Committee on Membership and Finance. It was decided by the Committee that both these articles should be published by the Society and recommendations as to the method of publication were made and referred to the Committee on Membership and Finance. A letter of acceptance of his appointment as Shattuck Lecturer for 1926 has been received from Dr. William Darrach, Dean and Associate Professor of Surgery of the College of Physicians and Surgeons, Columbia University, New York.

E. W. TAYLOR, *Chairman*.
R. B. O.

Dr. D. N. Blakely read the report of the Committee on Membership and Finance, as to Membership. It was voted to accept it and adopt its recommendations.

REPORT OF COMMITTEE ON MEMBERSHIP AND FINANCE, ON MEMBERSHIP

The Committee on Membership and Finance makes the following recommendations as to membership:

1. That the following named six Fellows be allowed to retire under the provisions of Chapter I, Section 5, of the By-Laws:

1. Brainerd, Walter Scott, Bradford, with remission of dues for 1925 provided that he pays the dues for 1923 and 1924.
2. Mangan, John Joseph, Lynn, with remission of unpaid dues.
3. McCarthy, Eugene Allan, Cambridge, as of January 1, 1926.
4. Stevens, Sara Elmina, Honolulu, as of January 1, 1926.
5. Sullivan, William Joseph, Lawrence, with remission of unpaid dues.
6. Walker, William, Revere, as of January 1, 1926.

2. That the dues of the following named two Fellows be remitted under the provisions of Chapter I, Section 6, of the By-Laws:

1. Favoloro, John Leo, Lynn.
2. Rabe, Edith Meek, Boston.

3. That the following named Fellow be allowed to resign under the provisions of Chapter I, Section 7, of the By-Laws:

1. Prior, Charles Edwin, Malden, as of July 10, 1925.

4. That the following named eleven Fellows be deprived of the privileges of Fellowship, under the provisions of Chapter I, Section 8, (a) and (b), of the By-Laws, as amended by the Society, June 10, 1925:

1. Aronson, Charles, address unknown.
2. Foley, Joseph Daniel, Springfield.
3. Kamberg, Samuel, Boston.
4. Kassees, Saad Hanna Allah, Jerusalem.
5. Parker, Frederick Daniel, address unknown.
6. Peterson, Carl Adrian, address unknown.
7. Redden, William Rufus, address unknown.
8. Robbins, Herman, New York City.
9. Rosenbloom, Carl Webber, Austria.
10. Stearns, Charles Maxwell, Chelsea.
11. Stevens, Henry Lawrence, New Bedford.

5. That the following named Fellow be deprived of the privileges of Fellowship, under the provisions of Chapter I, Section 8, (c), of the By-Laws, as amended by the Society, June 10, 1925:

1. MacKerrow, Horace Gilford, Worcester.

6. That the following named three Fellows be allowed to change their membership from one District Society to another without change of legal residence, under the provisions of Chapter III, Section 3, of the By-Laws:

One from Norfolk to Middlesex South.

1. Smith, Richard Ilsley, Wellesley Hills.

Two from Norfolk to Suffolk.

1. Grabfield, Gustave Philip, Milton.
2. Hornor, Albert Aurelius, Brookline.

Respectfully submitted,

DAVID N. BLAKELY, *Chairman*.

Dr. Blakely read the report of his committee, on Finance, and it was accepted and its recom-

mendations adopted, after a lengthy discussion of the question of publishing the two manuscripts presented to the Council on June 9, 1925, by the Committee on Public Health and referred to the Committee on Publications and Scientific Papers by the Council, at that meeting.

REPORT OF COMMITTEE ON MEMBERSHIP AND FINANCE, ON FINANCE

The Committee on Membership and Finance makes the following recommendations as to finance:

1. That the annual assessment for 1926 be $8.00.

This Committee at its meeting last week received advance informal notice that the Committee on Public Health would recommend to the Council today that reprints of Dr. Garland's Manual of Health Examinations, after publication in the *Journal*, be sent to all members of the Society, at an estimated expense of $330, more or less. The Committee felt that this method of distribution would be unsatisfactory and wasteful and that a better method of placing the reprint in the hands of those who would use it can be found; hence, we have not recommended any special appropriation for this purpose.

The Committee also had informal notice that a recommendation would be made to the Council today that the article by Dr. Edward G. Huber on the Communicable Diseases Prevalent in Massachusetts be published in the *Journal* and that about two hundred reprints be prepared for distribution and sale. The estimated expense of these reprints after publication in the *Journal* was somewhat less than $200.

2. The Committee recommends, therefore, a special appropriation at this time of an amount not to exceed $200 for the expense of these reprints if the article is published in the *Journal* as recommended.

Respectfully submitted,
DAVID N. BLAKELY, *Chairman.*

The details of publishing the two articles were discussed by Dr. Victor Safford, Dr. R. B. Osgood, Dr. D. N. Blakely, Dr. W. P. Bowers, Dr. S. B. Woodward, Dr. A. P. Merrill, Dr. B. P. Croft, Dr. J. W. Bartol, Dr. Samuel Crowell and others.

Voted: That the article on the Communicable Diseases Prevalent in Massachusetts, prepared by Major E. G. Huber for the Committee on Public Health, be published in the BOSTON MEDICAL AND SURGICAL JOURNAL and that reprints not to exceed 2000 in number be prepared for distribution to libraries and to public health organizations.

Voted: That the publication and distribution of the Manual for Health Examinations, written by Dr. Joseph Garland for the Committee on Public Health, be left to the committees on Publications and Scientific Papers, and on Membership and Finance, acting in coöperation.

Reports of the committees appointed to consider the petitions of T. B. Rafferty, T. F. Henry, H. E. Miner, E. A. Barrier, J. T. Reynolds, J. T. Buckley and H. N. Ginsburg, for restoration to the privileges of fellowship were read severally, the Council voting to restore the first six, under the usual conditions, and not to grant the petition of the last named.

Dr. A. P. Merrill, chairman, reported for the committee appointed to consider the control of the Sections. He said that the purpose of his committee had been misunderstood. No control in the way of limiting their activities was intended. The object in appointing the committee was to provide some workable machinery by which the Sections should elect their officers and should have someone to pass upon the papers that had been read, for publication in the official organ of the Society. The American Medical Association now has 15 Sections, the Massachusetts Medical Society has 6. The national society has a system by which its Sections are handled most successfully. Our Society has outgrown the lack of system that was sufficient for the managing of two Sections; to adopt a system similar to that of the national society would involve amending the By-Laws. His committee was studying the situation. The report was accepted.

Dr. A. E. Small presented a majority and a minority report of his committee of four on nurse anesthesia. (See Appendix No. 1.) On motion, duly made and seconded, it was *Voted,* That these reports lie on the table. Dr. Small *Moved,* It is the opinion of the Council of the Massachusetts Medical Society that the administration of an anesthetic for a surgical operation is a branch of the practice of medicine. The Chair asked if anyone seconded the motion. As no one did the motion was lost.

Dr. W. L. Burrage read a report on malpractice defence given by the Society to its Fellows from 1918, the date of the last report, to 1925, and it was accepted by vote. (See Appendix No. 2.) On motion by Dr. E. F. Cody it was *Voted,* That the chairman appoint a committee of three who shall, acting with the Secretary of the Society, consider the causes and methods of prevention, defence and insurance in cases of alleged malpractice, and shall report at a future meeting or in the BOSTON MEDICAL AND SURGICAL JOURNAL their conclusions and recommendations. The chair appointed as this committee: Dr. C. L. Scudder, Dr. J. W. Bartol, Dr. Kendall Emerson.

On nomination by the chair the following were appointed an Auditing Committee: F. P. Denny, Norfolk; F. R. Jouett, Middlesex South.

On motion by Dr. C. E. Mongan it was voted to change the name of the new section established last June, from Section of Physiotherapy to Section of Radiology and Physiotherapy. These officers of this new Section were nominated by the President and elected: *Chairman,* L. B. Morrison, Boston; *Secretary,* F. B. Granger, Boston.

The President called attention to the fact that by the last reapportionment of members of the House of Delegates of the American Medical Association, Massachusetts is entitled to six instead of five delegates, as in the past. He nominated and the Council appointed the following as sixth delegate and alternate, respectively, for the term of two years, from June 1, 1925, to June 1, 1927:

Roger I. Lee, Boston; John M. Birnie, Springfield.

The Council confirmed the appointment by the President *ad interim* of J. W. Bartol to the Committee of Nine, for the term of two years from June 1, 1925, and F. W. Snow to the Committee on Public Instruction, for one year from the same date; to fill vacancies. Dr. C. E. Mongan placed in nomination the following two names as honorary members of the Massachusetts Medical Society, in accordance with the provisions of Chapter I, Section 4, of the By Laws, the nominating papers being signed in both instances by C. E. Mongan and J. W. Bartol:

William Duane, A.B., A.M., Ph.D., S.D. (Hon.), Professor of Bio-Physics, Harvard University, and William T. Bovie, A.B., A.M., Ph.D., Assistant Professor of Bio-Physics, Harvard University.

He explained that in founding the Section of Radiology and Physiotherapy there was a need of men with the proper scientific background in this department of medicine and that there were no Fellows of the Society thus qualified. Dr. Duane and Dr. Bovie are willing to assist in establishing the Section. The names were referred automatically to the standing Committee on Membership and Finance for a report.

Dr. J. F. Burnham reported for Dr. H. G. Stetson, senior member, for the delegates to the House of Delegates, American Medical Association, concerning the meeting of that body last May; he defined the difference between members and Fellows of the Association, the former being all members of the State Medical Societies of the country, because of their membership in those organizations, the latter those who, being already members, paid a fellowship fee and with it the dues to the *Journal of the American Medical Association*. He urged all members to become Fellows, so that the fellowship may become as large as possible. He read to the Council the communication and resolutions which had been submitted to the House of Delegates by Dr. Victor G. Viecki, California. The resolutions were:

"1. Each and every properly elected delegate to the House of Delegates of the American Medical Association be appointed a committee of one, whose duty it will be to visit as an official representative of the American Medical Association each county unit in his district at least once during each calendar year.

"2. The American Medical Association will use all its resources in assisting delegates and committees in informing county medical societies as to impending legislation unfavorable to the application of medical science to the relief of the sick and injured, and as to the progress and method of enacting laws favorable to the proper practice of medicine.

"3. Each delegate or committee must report in writing to the proper bureau office at the headquarters of the American Medical Association the results of such visits."

On motion by Dr. Burnham the resolutions were adopted.

Dr. Bartol called attention to the fact that the Medical Society of the State of Pennsylvania was celebrating its seventy-fifth anniversary on that day at Harrisburg; he moved and it was voted unanimously that the Secretary telegraph the hearty congratulations of the Massachusetts Medical Society to the Medical Society of the State of Pennsylvania on its diamond jubilee.

Adjourned at 1.45 P. M.

WALTER L. BURRAGE,
Secretary.

APPENDIX TO PROCEEDINGS OF THE COUNCIL

APPENDIX NO. 1

REPORT OF COMMITTEE APPOINTED AT THE JUNE, 1925, MEETING OF THE COUNCIL, TO STUDY THE SUBJECT OF THE ADMINISTRATION OF ANESTHETICS BY NURSES

MAJORITY REPORT

The Committee appointed by the President in response to a vote of the Council at the June meeting of the Society, to study certain features of the subject of anesthesia, held two meetings during the summer and gathered certain data bearing on the matter at issue.

At the second meeting it became wholly apparent that no agreement could be reached and it was decided that the report of this Committee should be made as majority and minority reports for the Council to take such action upon as they deemed proper. The majority report is signed by Dr. F. G. Balch, Dr. P. E. Truesdale and Dr. C. F. Painter.

The reason for our disagreement was the belief of the majority that there is no ground for criticism in regard to the way anesthesia is being given at the present time. There appears to be no undue mortality as reported from hospital clinics, at any rate, and no dissatisfaction was heard of from private practice sources, either professional or lay. The schools and hospitals, the one in response to their educational responsibilities and the other for their own benefit, are giving attention to the training of students, internes and nurses to the end that they may safely be entrusted with the responsibility of administrating anesthetics.

The question of the legal responsibility of the actual administrator of an anesthetic could not be determined as that question has apparently not been raised in this community. It is the opinion of the

majority of the Committee that this question would be decided, should it arise, by holding the surgeon performing the operation responsible. The rock upon which your committee broke up was one which the Chairman had placed in the stream and around which the majority could not be steered, viz: that of the training and employment of nurse anesthetists. The majority of the Committee feel that the arguments in support of the undesirability of entrusting the administration of anesthetics to nurse anesthetists were not either valid or pertinent. Not only this but the practical experience of those who had employed them extensively and were competent to judge of their trustworthiness was strongly in their favor. We do not believe that the advances which will doubtless be made in anesthesia are destined to be for the most part achieved by the professional anesthetist but will be worked out generally in the laboratories of Physiology and Pharmacology and that therefore the argument that if, nurse-trained anesthetists are allowed to crowd out the medically-trained variety there will be no one being raised up to make these advances, is not a valid one.

We are of the opinion that the question of competition between the doctor and the nurse having aspirations to enter the field of anesthesia will settle itself on the only just basis for such settlement to take place and that is in answer to the question: Who does the work best in the eyes of the surgeon who employs them and assumes the sole responsibility for their technical skill, or lack of it?

We do not believe it any part of our responsibility to debar a nurse who has intelligence enough and technical skill enough to acquire the training required of her in any of our large hospitals to satisfy the authorities in those institutions, from exercising her skill under the supervision of any surgeon who has confidence enough in her to employ her. Furthermore we believe that the public is as safe in her hands as in the hands of similarly trained internes or doctors who, though competent, do not profess to be experts in anesthesia.

We recognize the fact that this question is being agitated elsewhere but so far as we are able to judge it has emanated from professional anesthetists.

(Signed:)

FRANKLIN G. BALCH,
PHILEMON E. TRUESDALE,
CHARLES F. PAINTER.

MINORITY REPORT

In submitting a minority report, objection is taken to the report just read on the general grounds that it represents merely the opinions of the signers which are not based on any investigation made by this committee. The mandate given this committee was "to study the question of nurse anesthesia in its legal, educational and medical aspects." The chairman does not consider that this is the time for any arguments in support of his personal views, and failure to answer statements in the report just read is not to be construed as acquiescence or inability to reply to them. Your time now should be used to listen to an account of the doings of your committee and such findings or conclusions as are warranted by the study made.

With respect to the legal aspect, nothing has been learned by this committee which would warrant the opinion as stated in the majority report that the surgeon performing the operation would be held responsible for the acts of the administrator of the anesthetic. We ought not to use that opinion as a balm to our consciences when the question arises as to whether we are leading a nurse to commit an overt criminal act by using her to give an anesthetic. The Statutes are so indefinitely drawn that, so far as I am able to learn, no one knows what constitutes the practice of medicine in the State of Massachusetts. A detailed account of this study is unnecessary, but a word on the medico-legal aspect is worth considering. Outside of Suffolk County the medical examiners interviewed are of two camps. One does not consider that a death on the operating table under anesthesia should come to their notice at all; another group desires to view all such cases with the frankly expressed purpose of being able to smooth over the unfortunate accident so far as the relations between the surgeon and the family are concerned. In either case no legal reports are filed which would enable anyone to determine the number of deaths on the operating table. Furthermore so far as our limited study is concerned, the records of the hospitals are not kept in sufficient detail to enable one to determine the circumstances connected with the death nor whether the anesthetic was given by nurse or doctor. A poor field for the statistician!

There is one person whose opinion might be worth while securing, namely, the counsel for the Society under the Medical Defense provisions. His opinion was sought up to the point where it seemed probable that it would cost the Society (or the chairman) a considerable sum of money. Let us hope that the legality of the practice will not be ultimately settled by an expensive law-suit instigated by some lawyer who has everything to gain and nothing to lose.

The only positive work which the committee did was in connection with the educational aspect. Reports were secured from the Boston City Hospital, the Massachusetts General, Peter Bent Brigham and Children's hospitals. No nurses are employed as anesthetists at the Boston City and it is therefore not considered. At the Children's nurse anesthetists only are employed. This hospital is not listed amongst the "Hospitals approved for Internship." In the other two hospitals anesthesia is given by both interns and nurses, the latter supervising the work of the intern. At the Massachusetts General an elective course for nurses is given of three months for training in ether only. Another course of three months is given to graduates for training in gas and oxygen, with the proviso that they stay at the hospital for a year. The hospital sometimes has difficulty in maintaining its staff of four etherizers as the field is not a popular one. So far as the number of hours training of the interns is concerned they would seem to be adequate, the practical instruction all being done by the nurses. There are 28 hospitals listed in Massachusetts as approved for internship by the Council on Medical Education and Hospitals of the American Medical Association, from only two of which reports have been sought by this committee. There are a total number of hospitals in Massachusetts of 336, from only four of which any report has been sought. Such a totally inadequate study of the anesthetic situation in this State does not warrant the drawing of any conclusions. However, I may be permitted to say, if it meets with the approval of this Council and it is the expression of their desires that two of the largest hospitals in the State should employ nurses to instruct the medical interns in anesthesia, in order to be consistent you should instruct your delegate to the Council on Medical Education and Hospitals of the National Society to advocate that Section V, Paragraph 9, of

the rules on "Essentials in a Hospital Approved for Interns" should be changed from reading "the intern should obtain instruction and experience in the various kinds of anesthetics, under experienced medical supervision" to read, in the last clause, "under experienced *nurse* supervision."

At the opening meeting of this committee one member of the majority stated that he always used nurse anesthetists and that he would not use a medical man; another member stated that if it were shown that it is illegal to use nurses to give anesthetics, he would promptly become a "bootlegger" and use them just the same. After due allowance for hyperbole, I leave it to this Council to determine the weight to be placed upon any conclusions which a majority, after such frankly expressed prejudice, might present. The following question was offered to the committee as a center about which discussion might revolve, namely:—"Is it for the best interest of the public health that nursing anesthesia be fostered and encouraged or checked and discouraged?" This seems to the chairman a fair and reasonable question which is entitled to an answer. So far as I am aware the majority have never answered that question and if I rightly interpret their report they merely advocate a middle-of-the-road policy, a blind adherence to the present conditions which offer nothing in the way of progress for the future. It was difficult to obtain an answer to any question submitted to the committee, but they fortunately were unanimous in their answer to one question, "Does anesthesia belong to the realm of nursing or medicine?" by saying that it belongs to the realm of nursing. Adherence to such an opinion is the only way it is possible to bring into conformity the views of one of the majority and his published adherence to the statement that there should be "a single standard of educational requirements for all those who practice the healing art, whatever application of their knowledge they may see fit to make." If anesthesia were a part of the practice of medicine he could not consent to a course of six months training.

The chairman assumes that he is the one referred to in the last paragraph of the majority report that agitation of this question has emanated only from "professional anesthetists" and he has no apology to offer for belonging to such a class, except to suggest that the term seems to be hardly of the best, bringing to one's mind rather baseball or golf, nor has he any apology to offer for having instigated this inquiry, inadequately as the committee has performed its work. His opinions have always been open to a forum of medical men for approval or disapproval, he has been accused of having an axe to grind, of a grudge against the nurses, etc., but when he asked consent to hold an open meeting to secure the opinions of other medical men his suggestion was vigorously opposed. When a majority stifles the expression of opinion by refusing to hold such a meeting you may draw your own conclusions as to which side apparently has a personal interest and place such weight as you desire upon their conclusion that there is "no ground for criticism in regard to the way anesthesia is being given at the present time," etc.

In conclusion, before any further study of the anesthesia situation is undertaken it is necessary to determine the fundamental point, whether the administration of an anesthetic for a surgical operation is a branch of the practice of medicine, and I offer a motion to that effect to be acted upon at the proper time.

The committee asks to be discharged.

(Signed)
A. E. SMALL, *Chairman.*

APPENDIX NO. 2

MALPRACTICE DEFENCE

REPORT TO THE COUNCIL ON THE MALPRACTICE DEFENCE WHICH HAS BEEN GIVEN BY THE MASSACHUSETTS MEDICAL SOCIETY TO ITS FELLOWS FOR THE PERIOD FROM JUNE, 1918, TO JUNE, 1925

For the benefit of the newer Councilors it may be stated that under the terms of the "Malpractice Act," which was adopted by the Council and by the Society in June, 1908, and reaffirmed by the Council, February 9, 1914, all active Fellows are entitled to receive, without cost to them, legal advice and court service of an attorney at law in the employ of the Society, for the purpose of conducting their defence in any court of this Commonwealth, when they are accused of malpractice. The Society pays no verdicts and no amounts which may be agreed on in settlement. The details of conducting the defence and the engaging of counsel are managed by the President and Secretary, acting together. Maybe this is the place to observe that a majority of suits for malpractice originate in incautious remarks made by physicians to the laity. A suit has been known to be started by a physician's shrug of the shoulders, so when you are asked if Dr. Brown's previous treatment had been correct, in your opinion, don't even raise your eyebrows.

At the annual meeting of the Council, June 18, 1918, Dr. G. W. Gay, "The Father of the Malpractice Act," as he has been called, made a report on the operation of the act during the first ten years. The report was printed in the Proceedings of the Council for that meeting. The following report covers the succeeding seven years. One notes a slight increase in cases of malpractice defence that have been submitted to the officers of the Society during these seven years, and this agrees with the finding of Dr. W. C. Woodward, Executive Secretary of the Bureau of Legal Medicine and Legislation of the American Medical Association, as reported to the House of Delegates last May. He had received reports on malpractice defence from 15 of the 32 State medical societies of the country that furnish such defence at the present time. In 1918 the number of such societies was 25. Now defence is provided by all of the societies of the New England States, except Rhode Island, and it is furnished by the neighboring States of New York, New Jersey and Pennsylvania—by 32 of the 48 States.

Many of our Fellows still feel that commercial insurance will relieve them of anxiety better than malpractice defence, notwithstanding that we have been told more than once by the lawyers that, in their judgment, commercial insurance has increased the number of suits for malpractice in the courts because, in most instances, the plaintiff may count on receiving some money in settlement from an insurance company. Almost always it costs less to settle than to fight. It has been the policy of the Society to fight all cases in which there has been a reasonable chance of success in obtaining a verdict or a non-suit. Unfortunately the cases of true malpractice defence, namely the blackmail suits, have been outnumbered by those in which the Fellow who has been threatened or sued, has been careless or negligent in his treatment. For instance: A Fellow of the Society has seen an injury where fracture might be suspected; he has treated the patient for a sprain; has had no X-ray taken; later the patient has drifted into other hands and an X-ray proved the presence of a fracture. Juries are sure to award damages in such circumstances. A settlement, on the best terms obtainable, is indicated, and so it is if a practitioner has been so inadvertent as to shut up in the abdomen a sponge, forceps or towel. No one, be he ever so eloquent, can persuade twelve good men and true that the foreign body was placed there by the Lord.

The question has arisen frequently how far the Society should go in defending its Fellows in instances where the Fellow who asks for malpractice defence has not given his patient what is called "reasonably skilful care." During the 17 years in which malpractice defence has been in force it has been the custom of the Society to be most lenient. Every application which presents a statement of facts from the Fellow showing that he has given the best care that he knew, has been accepted. It is to be understood, however, that at the time of application for defence, to obtain all of the data in any given case is an impossibility; many of the important items are brought to light only when counsel has prepared the case for trial in court, and even then all of them may not be known. No one is perfect and the most skilful make mistakes at times, therefore it has seemed to be only fair to give the applicant the benefit of any doubts.

In reading the statistics of this report, which are necessarily presented in brief form, Fellows must bear in mind that many of the cases overlap, that is to say, some of those reported in 1918 were not adjusted until the period covered by this report. Malpractice defence suits take a good deal of time for a final disposal, at the best; some of them drag along over a series of years, as in the two cases which resulted, on a first trial, in a verdict against the Fellow. These were argued before the Supreme Court with the result that another trial was allowed in each instance. These two have been the only ones lost since the act went into operation in 1908. In neither case has the Fellow been called upon to pay the amount awarded by a verdict; in both, all of the expenses of defence have been met out of the treasury of the Society.

Total number of inquiries answered and copies of Malpractice Act and application blanks sent out	77
New cases sent to counsel of Society	33
(NOTE—There have been three different regularly employed counsel. In cases away from Boston, local attorneys, selected by Society's counsel, have been employed.)	
Finished:	
Cases tried and verdict for defendant	10
Cases non-suited, "Agreement for neither party," or allowed to lapse	11
Cases settled by counsel for various sums, by consent of both the Fellow and the Society	12
Cases tried and verdict for plaintiff at first trial	2*
Total	35
Pending:	
Cases remaining in hands of counsel	11
Papers placed in Secretary's file, in event that a threatened suit may become an actual suit	8
Total	19
Grand total	54

*CASE 1. Begun in 1915. Eclampsia following delivery. Physician not present; drunken husband present. Burn of thigh; later both shoulders found to be fractured and put up with resulting stiff joints. Verdict for plaintiff for $5000, set aside by Supreme Court. No further trial has been had.

CASE 2. Begun in 1917. Fracture of tibia; no X-ray taken; question of reasonably skilful care. Defendant advised to settle, refused. First trial, verdict for plaintiff for $3000. Exceptions argued before Supreme Court and a new trial allowed. Three subsequent trials all resulted in disagreements of the juries. Fellow refused to settle at any time. Eminent up-state counsel, who had tried the last two trials for the Society, reported that the plaintiff had the best of the argument and that disagreements of the juries could not be obtained forever. President and Secretary, acting under Article Fourth of the Malpractice Act, at close of seven years of trials and after an expense to the Society of $2214.70, refused further defence.

In this report it is not feasible to specify the nature of all the cases that have passed through the hands of the Secretary during the past seven years. Sometimes the sort of alleged wrongdoing was not revealed to the applicant for defence by the lawyer who threatened suit. The most numerous have been the fractures, which numbered 15. Suits having to do with alleged unskilful treatment of confinements or miscarriage were 7. Of the burns—an equal number—3 were from the X-ray, 2 from hot water bottles and one each from a hot vaginal speculum and from chloroform given for anesthesia. Those involving removal of the tonsils, 6; for the alleged unskilful treatment of wounds, 5; for operations for appendicitis (gauze left in wound, faulty performance of operation, question whether the appendix had been removed), 5; for sprains, 3; for removal of the tubes and ovaries, 2; for the treatment of breast tumors, 2, and one each of the following: Alleged wrong prescription; Angina pectoris, said to be wrong diagnosis; Abscess of lung following anesthesia for extraction of tooth; Alleged circumcision of child when foreskin was retracted for cleansing; Commitment to State Hospital for observation; Double cross eye, operation, loss of eye; Death under ether anesthesia; Diphtheria; Injection of neosalvarsan; Failure to discover and remove bone in throat; Mastoid operation; Massage of prostate; Purpura hemorrhagica; Schick test; Vaginal hysterectomy, alleged wrong operation: Treatment of glaucoma; End of hypodermic needle left in thigh; Empyema.

The cost of malpractice defence to the Society during the last seven years has varied from year to year, as in the first ten-year period. It has averaged $1492 a year, according to the reports of the Treasurer—the lowest in 1918, namely $492.90, and the highest in 1924, $2669.69. The average yearly cost may be compared with the average for the first ten years, namely $504, although the highest figure was for the last year, 1917, when it was $1107.65, which is three hundred dollars below the average for the last ten years. It must be remembered that there has been an increase of cases and also that lawyers' fees have grown larger. Attorneys employed to look out for the trials at a distance from the headquarters of the Society are not apt to be so considerate in this respect as the regular counsel.

It would not be proper to close this report without calling attention to the debt of gratitude the Society is under to those of its Fellows who have given of their time and wisdom in testifying for the defence as experts in court, entirely without recompense. Of necessity this sort of service falls most heavily on those who have qualified through long years of experience in their chosen fields. Seldom has a Fellow been asked to help out a brother practitioner without a ready response. The Society has thanked, by a vote at an annual meeting, some of those who have thus assisted; others have not been mentioned in public but are none the less deserving of high praise. In a large number of instances of threatened suit the fact that the Society stands behind the accused has been enough to stop all further proceedings against the threatened Fellow, an important consideration in the blackmail cases especially. Placing the papers on file with the Secretary, ready for the filing of an actual suit, often results in no action by the plaintiff. As for those who have had the benefit of the Malpractice Act many letters and telephone messages have attested their appreciation. Any suggestions concerning amendments to the act, to render it more effective, are always welcome.

Respectfully submitted,

WALTER L. BURRAGE, *Secretary.*

ORIGINAL ARTICLES

TEACHING IN OUT-PATIENT CLINICS*

Application of the Appointment System

BY HAROLD C. STUART, M.D.

An important development in the organization of Out-patient Clinics during recent years has been the introduction of the "appointment system." This method of admitting patients to general medical and pediatric hospital clinics has passed the experimental stage and is working efficiently in many teaching hospitals. It was introduced for the double purpose of providing better service to the patient and of protecting physicians against the necessity of lowering their standards in order to care for a larger number of patients in any given clinic period. These phases of the "appointment system" have been adequately discussed in the literature and will not be further considered here[1], [2]. It is our purpose to discuss the manner in which this change in clinic routine can be used to improve the teaching of medical students in Out-patient Departments. The "appointment system" has been in use for well over a year in the Children's Hospital of Boston, where the third year students of the Harvard Medical School are first introduced to the study of the diseases of children. Its influence upon teaching facilities and standards of student work has been carefully observed and these observations form the basis for our conclusions.

In the first place it must be pointed out that any change which improves the advice and treatment given patients and the working conditions of physicians will inevitably react favorably upon students. The "appointment system" is based upon the principle that a patient should not be admitted to a clinic unless there is a physician present with sufficient time to give that patient careful individual attention and good treatment. This protects the physician from excessive pressure and removes any justification for poor work on his part.

Having emerged from the class room with high medical ideals and with the knowledge of the steps involved in adequate investigation and care of patients, students should have their first practical experience in clinics where they will see the principles they have been taught put into actual practice. It is essential, therefore, that any clinic devoted to the teaching of medical students should maintain the highest standards and that the records of patients serve as models for observation and review. The impossibility of maintaining these standards in clinics where admissions are not limited led to the segregation of students with only the more specially selected patients, who received rather excessive attention, while the other patients in the clinic were handled as necessity dictated. The chief defect in this plan from the student's standpoint was the retention of the group method of teaching, and the consequent failure to put the student in sufficiently intimate contact with the individual patient. It emphasized the impression that the student was being taught, and failed to develop the better mental attitude that he is being given an opportunity to learn for himself under close supervision and with adequate guidance. But the "appointment system" by helping to maintain the desired standards of work for all cases, removes the original cause for the grouping of students about specially selected cases, and makes any clinic case a suitable and valuable case for a student to study and observe. This is, of course, assuming that the teaching staff is well trained and will do good work if given sufficient time. Under these circumstances it is possible to substitute for the old group teaching plan a very individualistic type of instruction; and it also enables the students to associate intimately with the patients and to observe the instructors' methods of treating them.

The details of the method under which students will be fitted into an appointment clinic will vary greatly in different institutions. At the Children's Hospital in Boston we have made minor changes from time to time, but have come to feel that the following system is highly satisfactory. One or two students working with an instructor are assigned space in an examining room. One new patient is assigned to the students in each room at the beginning of the clinic period. They are expected to take a thorough history, perform a routine physical examination, and make any other clinical or laboratory examinations which they are fitted to carry out and which they consider to be indicated. While the students are thus engaged the instructor may be seeing other clinic cases by appointment, but being close at hand he may from time to time interrupt the students to show something of special teaching interest which he is dealing with, or the students may call upon him for special advice and assistance. In general, however, they work independently until prepared to have their case thoroughly reviewed. Time is reserved in the instructor's schedule toward the end of the teaching period for a thorough review and discussion of the students' case. An attempt is made in these discussions to review very closely the students' histories and physical examinations in order to insure habits

*From the Department of Pediatrics, Harvard Medical School, and the Medical Division of the Children's Hospital, Boston, Mass.

of care and thoroughness from the beginning. Then the case is used as a text for the discussion of diagnosis and other problems which are presented; treatment is discussed in detail, and finally the instructions for the care of the patient are given to the mother. Such a discussion will often consume the rest of the teaching period to advantage but when the case under consideration does not warrant so much attention, the remaining teaching time is devoted to observing patients whom the students have studied previously or patients who have been assigned to the instructor. Revisits for patients who have once been seen by students are especially arranged with this in mind; particularly those who present unsolved problems or those which show the results of change in diet or other modes of therapy. A patient once seen by an instructor is always assigned to him for subsequent visits, and as students work with the same instructor during the entire time of their clinic assignment, the "appointment system" itself provides a very simple method of having them follow their own cases. This is of particular value in patients requiring X-ray, tuberculin tests and other laboratory data or consultation opinions before final diagnosis can be made; and also to learn the effects of changes in formulae in feeding cases.

It will be noted that the number of patients seen by any one student during the period of his assignment under this system is not great, averaging little more than one new and two or three old cases a morning. But the type of training made possible under such a preceptorial system would seem to lay the very best foundation for the study of clinical medicine. It is not our primary purpose during this few weeks' period to give students a complete knowledge of clinical medicine, for this they should be acquiring either with or without assistance during years to come; but rather to give them at the start a knowledge of methods, an orderly system and an attitude of mind which will make their future work more fruitful. For this reason the number of cases seen is of much less significance than the circumstances under which they are seen. In pediatrics it is especially difficult to acquire the art of examining patients, and to learn how to elicit physical signs in spite of opposition; yet this art must be acquired to some extent at least before one can make any progress in the study of the diseases of infancy and childhood. The method of teaching described offers the relative quiet, the time and the assistance necessary to acquire this art.

Another effect of this type of instruction which has been observed is the better appraisal that is made of the student's ability and his special needs. The contact existing between student and instructor is of necessity very close, and the possibility of an inferior man obtaining a better grade by creating a false impression of his ability and knowledge is much less than where students work in groups, or shift from day to day between various instructors. An instructor can also more quickly sense a student's individual needs, and devote special attention to the phases of his work which appear deficient.

It might be offered as an objection that such a system requires either an increase in the number of instructors or more time from the men already teaching. The number of instructors required depends upon the number of students assigned to each section, so that in some institutions the change from the group to the preceptorial plan would result in an increase in the teaching staff. We believe, however, that the more men working in a clinic who can have a part in teaching, the better for the institution, the physicians and the patients. Teaching of this type acts as a constant incentive to learn and to do good work. Many men, while young, are well fitted to teach because they have the ambition, the time and the recent training. But because of the infrequent additions to the teaching staff many years pass without the incentive derived from teaching and when the opportunity arrives the man may be actually less fit. But the more important factor is that instead of teaching occasionally and doing ordinary clinic work the rest of the time, under the new arrangement the instructors teach all of the time that they are in the clinics. The time devoted to the teaching is not lost to the clinic, nor the clinic time to the students.

In conclusion, we feel that the "appointment system" of clinic management offers several distinct advantages from the standpoint of Out-patient Department teaching. In the first place the instructor comes to know his students very intimately and he is given sufficient time to devote careful attention not only to the question of history taking and physical examination but to the general measures of diagnosis and treatment. The student's first contact with patients becomes a most natural and intimate one, and yet keeps him under the closest possible supervision of his instructor. It further gives him an opportunity to observe his instructor at work in a normal way with routine cases, and gets away from the staged demonstration of cases already studied and specially selected. Thus it gives all the advantages of the old fashioned method of studying in a physician's office, with the added advantages of modern knowledge and facilities. A realization that a patient is a living human problem, and not an object of interest is more quickly established. Under such circumstances as these we believe good teaching can be done and that an Out-patient Department can compete with a hospital ward as an attractive place in which to study medicine. These improvements made possible in teaching

facilities seem to add one more argument to those already given for the introduction of an "appointment" system in Out-patient Clinics to which students are assigned.

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1 Clinic Service by Appointment. Janet Thornton. The Modern Hospital, Vol. XXII, No. 6, p. 596. June, 1924.
2 Appointment System in the Children's Clinic of the New Haven Dispensary. Ethel C. Dunham. The Modern Hospital, Vol. XXI, No. 1, p. 87, July, 1923.

UTERINE RUPTURE AT TERM AFTER PREVIOUS CAESAREAN OPERATION

A Case Report

BY ROY J. HEFFERNAN, M.D., BOSTON, MASS.

MEDICAL literature contains several reports of ruptured uteri during pregnancy or labor, in patients who have had a previous Caesarean section. Certain unusual features of the following case, however, induced the author to publish it.

Mrs. B., a quintipara, aged 38, was seen at the Codman Square Hospital, Feb. 12, 1925. She had entered the evening before and preparations were made for a Caesarean section.

The family history was unimportant.

Past history: measles and bronchopneumonia 13 years ago; tumor of breast removed 17 years ago.

Obstetrical history: 1. 1910, Caesarean section, after a long labor; "doctor said pelvis was too small."

2. 1913. At the eighth month of gestation, patient fell down a flight of stairs. This caused the death of the foetus, which was delivered by high forceps one week later.

3. 1916. Three weeks before term the parturient developed acute appendicitis. Caesarean section was done, followed by appendectomy.

4. 1919. Caesarean section at term.

5. The last catamenia was May 5, 1924. The woman had been under the supervision of her family physician throughout pregnancy, which was essentially normal. Feb. 12, 1925, Caesarean operation at Codman Square Hospital, Dorchester. Labor had not started and the patient felt perfectly well, temperature 98.4°, pulse 84 and respirations 24.

Incision to left of umbilicus, as at the previous operations. Several omental adhesions were separated and the uterus exposed. A scar could be plainly seen on the anterior surface, at the upper angle of which a circular mass of placenta, about four inches in diameter, protruded. The visceral peritoneum of the uterus had torn for about an inch over the center of the visible placenta, making the uterine rupture complete.

The anterior wall was quickly incised and a large, healthy, male child was delivered. That part of the placenta which had erupted through the uterine wall, while slightly paler, did not differ in other respects from the remainder of the organ. This would indicate that the accident occurred a short time before its discovery.

The myometrium was beveled to the thickness of paper at the site of rupture and part of the wall had to be resected to permit suturing. The uterine incision was then closed with three layers of continuous chromic catgut and the abdominal wall sutured in the usual manner.

Convalescence was uneventful and the patient left the hospital with her baby on the fourteenth day.

Comment: Two lessons may be drawn from the above case.

First, uterine rupture, although usually accompanied by definite signs and symptoms, may occur without warning.

Secondly, patients whose uterine walls have been weakened by one or more Caesarean sections should be under close observation in the latter weeks of pregnancy and subsequent Caesareans should be performed a few days before the estimated date of labor.

THE COMMON COLD AGAIN

THE *Monthly Bulletin of the Boston Health Department* has published, in its September issue, an excellent and timely article entitled "An Unsolved Health Problem." The common cold does not furnish one of the picturesque altitudes of medicine. The blowing of a nose has little of the romantic qualities associated with the drainage of a gall bladder or the evacuation of a brain abscess. Nevertheless few diseases can compare with the common cold for disability, mortality and economic loss, and there is little indication that it is being affected by increase either in scientific knowledge or in appropriations for public health purposes.

One interesting and valuable point brought out by the *Bulletin* is the increasing evidence that the air-borne process of infection may be secondary in importance to transference of infection by soiled fingers, handkerchiefs, towels and utensils. Army experiences have shown that the prevalence of colds and sore throats among large bodies of men can be greatly lessened by boiling men's gear.

The common sense articles published by the *Health Department Bulletin* are almost uniformly timely, interesting, and valuable. We would recommend to those of our readers to whom it is available a regular perusal of the *Bulletin* with an interest second only to that which is accorded the JOURNAL.

Case Records
of the
Massachusetts General Hospital

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY
RICHARD C. CABOT, M.D., AND HUGH CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

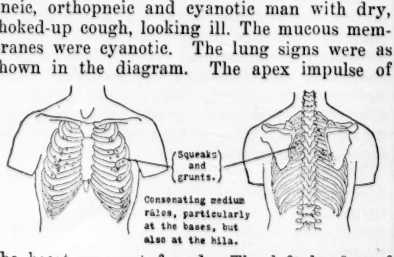
CASE 11441

MEDICAL DEPARTMENT

An Irish waiter of sixty-nine came to the Emergency Ward April 10 complaining of cough. His father, mother and two sisters died of tuberculosis. He had always had good health except for a slight touch of influenza in 1918. He drank three or four glasses of liquor a day before prohibition, and still took an occasional glass. He formerly smoked heavily, now not at all.

Eight or ten years before admission he began to have "asthma" and "bronchitis" lasting from March into May—chiefly cough and difficult breathing. The symptoms had recurred regularly every year. Two years before admission he began to have difficulty in starting the urinary stream, found it lacked force, and began to urinate at night, at first occasionally, now usually. Nine months before admission he noticed a little dyspnea on climbing stairs. Five months later this was worse, but not crippling. Two months before admission his annual attack of cough and difficult breathing began. Two weeks before admission both these symptoms were more marked, and he noticed for the first time swelling of the feet and ankles. Twice within two weeks he had vomited suddenly without preceding nausea. He had occasional severe headache with ringing in the ears. He continued to work until April 8, and did not feel particularly ill at admission.

Examination showed an obese, florid, dyspneic, orthopneic and cyanotic man with dry, choked-up cough, looking ill. The mucous membranes were cyanotic. The lung signs were as shown in the diagram. The apex impulse of



the heart was not found. The left border of dullness was 11 cm. from midsternum, 2.5 cm. outside the midclavicular line. The right border of dullness was 3 cm. to the right. The supracardiac dullness was 6 cm. The sounds were of fair quality. There was auricular fibrillation. The blood pressure was 155/60-150/65. The abdomen was distended. The extremities showed varicose veins. The pupils were irregular and reacted sluggishly to light. The ankle jerks were not obtained. The other reflexes were normal.

The temperature was 100.7° to 103.8°, rectal, the pulse 80 to 122, the respiration 23 to 33 with a terminal rise to 52. The urine was dark at one of two examinations, cloudy at the other, showed a slight trace of albumin at both, specific gravity 1.018-1.020. The amount was normal on the two occasions recorded. There was a residual of 700 c.c. April 11, 750 c.c. April 12 and 15, 450 c.c. April 14. The renal function could not be estimated, as the patient could not void. The hemoglobin was 75 per cent. The leucocytes were 12,600, the polynuclears 79%, the reds normal. A Wassermann was negative. The non-protein nitrogen was 35 mgm.

The morning of April 12 there was dullness at the left base and the general condition was worse, though the heart action was regular except for occasional extrasystoles. Next day the patient was delirious and incontinent. April 15 he died.

DISCUSSION

BY DR. MAURICE FREMONT-SMITH

The asthma complained of by this patient was probably an asthmatic bronchitis, the type of asthma usually found in older patients and coming on subsequent to upper respiratory infection. We find these patients often have an underlying myocardial weakness, the respiratory infection causing an otherwise compensated heart to fail partially. It is therefore in this group of so-called asthmas that digitalis, even in a heart with regular rhythm, is often advantageous, in contrast to the cardiac nocturnal asthma cases in which there is usually cardiosclerosis and arteriosclerosis of such a degree that digitalis is of no use and morphin must be used. The actual bronchial spasm causing the asthma in cases like this particular patient may be due to an anaphylaxis caused by a bacterial antigen. Bacteria, however, are looked upon at present rather askance as the cause of bronchial asthma, and attempts to desensitize against bacterial antigens have proved of doubtful expediency in contrast to desensitization of pollen or protein cases, in which favorable results are reported in from fifty to seventy-five per cent. In a case such as the present, however, the infectious element is the prominent one. Prevent the patient from catching cold and developing bronchitis and we probably can prevent his asthma.

The swelling of the ankles is another evidence of cardiac failure. The vomiting may be due to congestion or to an underlying cirrhosis of the liver. The physical aspect of the patient is against cirrhosis. These cases, by the time symptoms are apparent, have usually lost considerable weight, present the drawn facies and big abdomen characteristic of the disease. The dyspnea, orthopnea and cyanosis go with cardiac failure. That the condition is not one entirely of cardiac decompensation, however, is shown by the chest signs, in which râles are absent at the bases and present in the mid-chests.

The temperature at entrance is easily explained by bronchitis, later probably going on to bronchial pneumonia. The heart is evidently very definitely enlarged. The blood pressure has probably been considerably higher. The observation upon the pupils would suggest neurosyphilis in a younger man, but we often see sluggish pupils and even slight irregularity in the aged. That the ankle jerks were not obtained is a significant and perhaps important observation to which I should again attach far more importance with the patient in the twenties or thirties.

There is evidently marked prostatic obstruction which in itself would have accounted for a low renal function if this had been obtained. Of course the fact that the patient could not void is no excuse for not doing a renal function were this considered necessary. There is nothing in the urine to suggest disease of the kidneys, although a sediment might throw further light upon the kidney condition. Chronic nephritis, however, with a hemoglobin of 75% and a gravity of 1020 is very unlikely. The negative Wassermann does not rule out neurosyphilis. The normal non-protein nitrogen, however, does eliminate the possibility of much harm to the kidneys from back pressure.

The patient was probably thoroughly digitalized, and if this was a fairly recent case possibly quinidine was given. The auricular fibrillation was either controlled by this drug or else was paroxysmal in type, as very frequently occurs in the sclerotic heart. The patient died of bronchial pneumonia and not of cardiac failure.

I expect to find at necropsy the usual signs of congestive failure, an enlarged sclerotic heart without evidence of valvular disease, bronchial pneumonia at the left base, possibly evidence of healed tuberculosis of the apices and an enlarged non-malignant prostate.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Arteriosclerotic heart disease.
Congestive failure.
Bronchopneumonia.

DR. MAURICE FREMONT-SMITH'S DIAGNOSIS

Enlarged sclerotic heart.
Chronic passive congestion, general.
Bronchial pneumonia, left base.
Possible healed tuberculosis of the apices.
Enlarged non-malignant prostate.

ANATOMICAL DIAGNOSIS

1. *Primary fatal lesions*

Slight general arteriosclerosis.
Arteriosclerosis of left coronary with area of chronic interstitial myocarditis in the wall of the left ventricle.

2. *Secondary or terminal lesions*

Hypertrophy and dilatation of the heart.
Lobar and focal pneumonia.
Ulcer of duodenum with slight hemorrhage into the gastro-intestinal tract.
Lymphomatous infiltration and focal fatty metamorphosis of the liver.
Hypertrophy of the spleen.
Wet brain.

3. *Historical landmarks*

Slight chronic pleuritis, right.
Slight hypertrophy of the prostate.

DR. RICHARDSON: Head: The pia was rather markedly infiltrated with thin pale fluid. The vessels of Willis showed a moderate amount of fibrous sclerosis. The brain weighed 1421 grams. The tissue was rather wet.

In the upper part of the left inguinal canal there was a small loop of sigmoid which was easily removable. The canal admitted three fingers.

The stomach contained a small amount of blood-like material, and there was some reddening of the mucosa.

Intestines: There was some reddening of the mucosa, but the intestines were otherwise negative except that the duodenum contained a small amount of blood-like material, and at a short distance below the pylorus there was a loss of substance 6 mm. in diameter with round margins and dark red, slightly irregular base to which blood-like material was weakly adherent,—bleeding ulcer.

There were a few pleural adhesions to the diaphragm on the right, none on the left. The trachea and bronchi contained much mucopurulent material, more abundant on the right. The mucosa was reddened. The bronchial glands were moderately enlarged, brown red, plump and juicy.

The apex of the right lung was negative. The upper two-thirds of the upper lobe was voluminous and solid,—frank gray-red pneumonia. The tissue elsewhere showed moderate edema.

The pleura over the consolidated portion was coated with fibrinous exudate. The apex of the left lung was negative. The tissue generally showed moderate edema. In the lower part of the upper lobe there was a small focus of gray-red pneumonia and a few foci in the lower lobe. These foci were in the substance of the lung.

The pericardium was negative. The heart weighed 590 grams, considerably enlarged. (Normally 200-350.) The myocardium generally was negative; but in a portion of the wall of the left ventricle, extending from the apex up over an area 8½ by 4 cm., the section surfaces showed well marked fibrous myocarditis with much thinning of the wall. The right ventricle wall was 4 mm., the left ventricle wall 14 mm., but it was 4 mm. in the region of the myocarditis. There was slight dilatation of the left auricle and localized dilatation of the ventricle. On the right side there was slight dilatation. The valves and the auricular appendices were negative. The left coronary was small and showed much sclerosis, with marked diminution of the lumen in places. This was most marked in the portion leading to the area of thinning in the left ventricle wall. The circumflex showed a slight amount of sclerosis. The right coronary was capacious and showed a moderate amount of sclerosis. The aorta and great branches showed a moderate amount of arteriosclerosis.

The liver weighed 1600 grams. (Normal 1200-2400.) The right lobe was of good size. The left lobe was rather small. The surface of the left lobe was finely to coarsely granular, the surface of the right fairly smooth. The tissue of the right lobe was rather tough and the section surfaces gray brown-red, rather homogeneous and finely granular. The tissue of the left lobe was leathery, gray brown-red and rather granular. The sections showed lymphomatous infiltration along the portal canals and fatty metamorphosis in places.

The spleen weighed 380 grams, moderately enlarged. (Normally 80-180 grams.) The surface was smooth. The tissue showed a slight increase of consistence and was dark brown-red.

The kidneys were negative except that there was some lymphocyte infiltration about a few of the blood vessels.

There was slight hypertrophy of the lateral lobes of the prostate and a small so-called middle lobe. There was little if any obstruction of the urethra.

CASE 11442

Children's Medical Department

A twenty-seven-months-old girl of Italian parentage entered December 6. The chief complaints were high temperature, cough and convulsions. The family history was good. The child was normally delivered and weighed nine pounds at birth. She was breast fed for four months, then fed by a formula. She gained well and developed normally. Except for occasional gastric upsets with vomiting and a tendency to constipation she was in good health and active in play until the present illness.

Two days before admission she became feverish. A doctor was called who made a diagnosis of grippe, left medicine, and advised a mustard bath. High fever persisted the following day, and the child drank much water. After a dose of castor oil she had yellowish to greenish movements. December 5 she had her first convulsion, in which she became rigid and cyanotic, rolled her eyes and foamed at the mouth. She had had occasional cough during the present illness.

Examination showed a well nourished child, unconscious. Upon being disturbed she had a convulsion. The left ear drum was bulging, otherwise the head was normal. The throat was reddened. There were some mucous râles over the bases of both lungs, with slight diminution of breath sounds in the right base. The heart was normal in size. The rate was rapid (162) and regular. The heart showed no other abnormalities. The abdomen was slightly distended but soft. The cervical, axillary and inguinal lymph nodes were enlarged. The abdominal and knee reflexes were not obtained.

During the convulsions the child became rigid, the lower jaw contracted firmly with crunching of the teeth, the face became cyanotic. At times there was frothy foam from the mouth and the eyes were fixed and staring. Then she became limp and flaccid. The right and left lower arms at times appeared bluish-red as though constricted by a tourniquet. The fingers of the right hand were held flexed much of the time.

The temperature was 105.5° to 108°, the pulse 161 to 176, the respiration 85 to 89. The urine is not recorded. The hemoglobin was 100 per cent., the leucocyte count 9,950, the red count 5,776,000. Lumbar puncture showed a pressure of 160 mm., no block, no increase in cells, albumin normal, no globulin, total protein 12, goldsol 1111000000, sugar 60, chlorid 709.*

The child was given colonic irrigations. Fluid intake was encouraged. Alcohol sponge baths every four hours were ordered, and six ounces of water with ten grams of glucose every two hours.

The day of admission left paracentesis was done. Fluids given by mouth were vomited. The child had several convulsions, some of the *petit mal* type, others general. The temperature

*Normal readings: Pressure 80-190, protein 20-40, sugar 50-70 (fasting), chlorids 720-740.

gradually increased. Early in the morning December 7 she died.

Discussion

BY DR. FRITZ B. TALBOT

The convulsions of this child apparently impressed those who were observing her as being similar to the convulsions of epilepsy. She also had an otitis media and suggestive signs of a bronchopneumonia. It does not seem reasonable to assume that this child had epilepsy, because in the majority of instances fever corrects attacks rather than causes attacks of epilepsy, and it seems more probable that the convulsions were due to the otitis media.

An encephalitis or meningitis was ruled out by the lumbar puncture and the absence of an increased cell count or change in the chemistry of the spinal fluid. The possibility of tuberculous meningitis has to be borne in mind, but a sudden onset of this type is very rare indeed. Paranoic symptoms of tuberculous meningitis are change in character, vomiting, or other minor complaints. None of these symptoms appear in the history of this child.

The diagnosis comes down to nasopharyngitis, otitis media and a possible bronchopneumonia with convulsions. It is very unusual for a child to die of uncomplicated otitis media. The only possible explanation is that there was in connection with this an associated status lymphaticus. There are no physical signs noted in the history of any previous symptoms which would suggest this condition.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Nasopharyngitis.
Acute otitis media, left.
Bronchopneumonia?
Brain abscess?

DR. FRITZ B. TALBOT'S DIAGNOSIS

Nasopharyngitis.
Otitis media.
Possible bronchopneumonia.
Convulsions.
Status lymphaticus?

ANATOMICAL DIAGNOSIS

Otitis media, right and left.
Status lymphaticus.

Dr. Richardson: Head: In the left external ear there was a small amount of dirty brownish red crusty material. The meninges, the vessels of Willis and the sinuses were negative. In each middle ear there was a collection of frank pus. The posterior nares and the ethmoidal and sphenoidal sinuses were negative. The pineal and pituitary glands were negative. The brain weighed 1110 grams. The tissue was negative. The upper end of the spinal cord was negative microscopically and macroscopically.

Trunk: The subcutaneous tissues in the anterior thoracic wall were infiltrated with thin pale fluid. The intestines were negative except that the follicles generally showed a well marked hyperplasia. The mesenteric glands were moderately enlarged. The tissue was plump and pale. The thymus gland was present and weighed 25 grams, moderate hypertrophy. The tissue was pinkish gray and meaty. The lung tissue was pinkish brown-red, spongy, and yielded a moderate amount of thin reddish frothy fluid. The tissue of the spleen was negative except that the follicles showed marked prominence.

A case then anatomically of double otitis media associated with status lymphaticus.

CASE 11443

Urological Department

An American eighty years old entered June 8 complaining of pain in the penis, urgency and frequency of urination. He had always been well and strong and had had no operations or serious illnesses except a right cataract extraction ten years before admission.

Two years before admission he began to urinate twice at night and frequently by day. It also required more force to start the stream than before. These symptoms continued unchanged until ten days before admission, when the frequency increased to about once in three-quarters of an hour with great urgency, the passage of small amounts, and with great pain at the end of micturition.

Examination showed a well nourished old man not looking ill. The heart was not enlarged to percussion. The sounds were faint. There were many extrasystoles. The artery walls were not felt. The blood pressure was 190/90. Rectal examination showed the prostate to be symmetrically enlarged. There was internal strabismus and cataract of the left eye. The iris on the right was irregular (cataract operation). The pupillary reactions and the other reflexes were normal.

Except for a rise of temperature to 101.5° and of pulse to 90 the morning after admission the chart was not remarkable until after the operation. The urine was dark red, 36 to 61 ounces, specific gravity 1.024, a large trace to a slight trace of albumin, sediment loaded with blood. The non-protein nitrogen was 58 mgm., the uric acid 3 mgm. The blood is not recorded. There was a residual urine of 120 c.c. At a renal function test the appearance time could not be read; in two hours 25 per cent. A Wassermann was negative. X-ray films of the kidney region were unsatisfactory. Cystos-

copy was attempted, but nothing could be seen on account of fresh bleeding.

The patient had frequent attacks of dysuria and frequency. Irrigation of the bladder seemed to relieve him temporarily.

June 11 operation was done. After it he seemed to be in good condition except for mild delirium and mental cloudiness. He appeared dehydrated, and was given two subpectorals of 2000 c.c. each. The pulse was irregular and over 100. The temperature 101.3°. Next day his condition was much worse. The pulse was 140, rising in two hours to 160. He was still irrational. June 13 he went into coma and June 14 died.

Discussion

BY DR. EDWARD L. YOUNG, JR.

This is a short history, at eighty, for prostate,—which is of course the first diagnosis that we consider where urinary difficulty exists in an old man,—because prostatic symptoms as a rule begin before seventy. They may last for a good many years before the patient comes for help, but the beginning is generally in the sixties or at least the early seventies. The progress of the trouble may be slow. But at eighty to have a story go back as definitely as this does only two years makes us at once suspicious that it is something more than a simple adenomatous obstruction of the prostate.

It is of course of great importance to be sure that reflexes are normal when there is any urinary disturbance, because it is perfectly possible and in fact frequently happens that the first signs of tabes in a man of prostatic age are the symptoms ordinarily ascribed to urinary obstruction. So that it is well to be sure that the reflexes are all present and normal.

Of course this can be prostate. We do see patients where the reserve power in the bladder wall has been sufficient to drive the urine past the obstruction without any apparent symptoms to the patient for an unknown period of time. Then the symptoms will develop very rapidly and all there is present to account for it is a simple adenomatous enlargement the removal of which will cure the difficulty. But as I said, the short symptoms in a man of this age make one think either of malignant disease of the prostate or, where the urgency and the pain after micturition are as marked as here, of some growth in the bladder wall which is squeezed upon when the bladder empties, or of a stone. So that we have to be sure of those conditions before we can make an absolute diagnosis.

An acutely congested prostate or an acute cystitis will cause this amount of blood. Likewise carcinoma or stone will cause it. So that does not help us very much.

The non-protein nitrogen is higher than normal, but not very much.

Residual urine between three and four ounces is not very much,—enough of course to show obstruction, but not enough obstruction in itself to account for the severe symptoms he has.

Twenty-five per cent. is a very decent function.

Of course before operation is done there are things which it seems fair to do. The record says that the X-rays of the kidney region are unsatisfactory. Of course X-rays of the bladder region should show a stone if present. Those presumably have been done. I have never seen but one instance where X-ray reported no stone in the bladder and cystoscopy showed it. But that is possible, and the first thing I should want to know is, does the X-ray show stone in the bladder region? In the face of the blood present then it seems to me the next thing to do is a cystoscopy, with things ready, in case it is a small carcinoma or in the other extreme a carcinoma that is inoperable, to use diathermy or implant radium seeds through an operating cystoscope. The films were underexposed, so that the only thing we have to go on is the acute bleeding brought on by instrumentation. In spite of bleeding a stone will nearly always be seen during cystoscopy. That amount of bleeding can come from ulceration of the prostate.

As to tumor of the bladder versus malignant prostate: At his age if it is tumor of the bladder it probably is malignant, so I think we can use the word tumor with that understanding. Malignancy of the prostate generally starts at the posterior lobe and as a usual thing it can be felt by finger. So that if there is malignancy of the prostate it is one of the more uncommon types in which there is malignant degeneration of the lobes. It seems to me that with these relatively short symptoms and the severity of the symptoms at present, the only thing to do is to open the bladder above, give it drainage, see whether it is an operable condition; but on the evidence that there is here, believing that it is malignancy of the bladder and that the chance of cure is doubtful. I do not see that there is anything else to consider seriously. Of course at his age the prognosis is bad in any event.

DR. YOUNG'S PRE-OPERATIVE DIAGNOSIS

Malignant disease of the bladder.

PRE-OPERATIVE DIAGNOSIS

Carcinoma of bladder.

OPERATION

Spinal novocain, two tablets, gave very satisfactory anesthesia. An incision 15 cm. long was made in the midline suprapubically and the bladder opened. A sloughing solid tumor about 3 cm. in diameter was found arising from the region of the left ureter. It was removed and the base thoroughly treated with diather-

my. There did not appear to be much enlargement of the prostate. The bladder was closed about the suprapubic tube.

PATHOLOGICAL REPORT

Irregular soft fragments removed with the cautery.

Microscopic examination shows solid masses of atypical epithelial cells with little stroma. There are numerous cornified cells among them.

Carcinoma.

FURTHER DISCUSSION

From the technical side of it it would seem to be the type which has a chance for cure, more than the average carcinoma of the bladder.

DR. RICHARDSON: What was the pathological report?

DR. YOUNG: All it says is carcinoma.

Apparently the operation was more than eighty years could stand.

With what evidence we have I do not think that there will be any serious damage to the kidneys. The left kidney may have a somewhat damaged pelvis and be acutely congested because of the obstruction caused by the operation near the opening, which may have been partly occluded. Of course there is always the possibility of terminal pneumonia in a man of this age.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Tumor of the neck of the bladder.
Uremia.
Arteriosclerotic heart disease.
Diathermy of papilloma of the bladder.

DR. EDWARD L. YOUNG'S DIAGNOSIS

Carcinoma of the bladder.

ANATOMICAL DIAGNOSIS

1. *Primary fatal lesion*

Papilloma of the bladder.
Area of necrosis in the bladder wall.

2. *Secondary or terminal lesions*

Cystitis.

3. *Historical landmarks*

Hypertrophy of the prostate.
Operation wound.

DR. RICHARDSON: We cannot contribute much on this case, because the examination was absolutely limited to the region of operation in the left lower quadrant. We found a hypertrophied prostate, moderate hypertrophy of the lateral lobes. There was no peritonitis made out so far as we could examine.

There was some thickening of the bladder wall and cystitis, and in the region of the lower part on the left side, just above the prostate, a small, dirty, brownish-red, rather flat necrotic mass. Cross section showed necrosis continuous with a thick irregular layer extending into the bladder wall. The report of the microscopic examination states that the sections from that region failed to show any evidence of carcinoma. So that it must have been superficial on that basis.

DR. YOUNG: It was a more or less pedunculated tumor, which I think is unusual.

SING SING HAS FEWER DRINKERS THAN DRYS; MORE SINGLE OFFENDERS THAN MARRIED ONES

MORE criminals received at Sing Sing are abstainers from liquor than drinkers, more are single than married and more were employed than were idle when they got into trouble, according to statistics given out today by Warden Lewis E. Lawes relating to 1,217 offenders admitted during the State fiscal year that ended on July 1 last.—*New York Times*

TUBERCULOSIS FIGHT NEEDS $5,300,000 IN 1926

THE gross income from the last seal sale was $4,517,000, but it will be necessary to raise at least $5,300,000 through the 1925 seal sale to finance tuberculosis work in the 48 states during 1926. These figures will provide only a slight increase in funds in each state.—*Bulletin of the National Tuberculosis Association.*

FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE

THE Sixth Congress of the Far Eastern Association of Tropical Medicine is being held in Tokio, October 11 to 31. The Pan-Pacific Union is being represented by Dr. Frederic E. Trotter, Superintendent of Public Health in Hawaii, who has brought an invitation to hold the Seventh Congress in Honolulu in 1928, as a part of the Pan-Pacific Medical Conference in Honolulu that year.

CONCENTRATED COD LIVER OIL

Drs. Harry E. Dubin and Casimer Funk, according to *Science*, have been able to concentrate cod liver oil to such a degree that one-tenth of a gram of the final potent extract represents the active principle, both as regards vitamin A and the anti-rachitis factor, of 2,000 grams of cod liver oil. Moreover—and this should be of interest to modern mothers—most of the taste is left behind with the bulk.

THE BOSTON
Medical and Surgical Journal
Established in 1828

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The Journal does not hold itself responsible for statements made by any contributor.

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SURGERY AND DIABETES

FOR years the diabetic patient has been taboo for the surgeon. Only as a last resort was surgery attempted, and the results were such as would be expected from "last chance" operating. However justifiable such a view may have been in the past, the advances in the treatment of diabetes are compelling its abandonment.

The present opportunity, or rather duty, which the surgeon has with regard to the diabetic patient is well set forth by Jones, McKittrick and Root[1]. The sufferer from diabetes is already staggering under all the burden he can bear. To neglect or fear to treat a septic focus not only permits the lesion itself to progress, but aggravates the diabetes. The action of an infection in lowering sugar tolerance is only too well known; the rapid rise of tolerance when recovery occurs is equally familiar.

A patient with cholecystitis or subacute appendicitis is just as truly septic, though to a less degree, as one with carbuncle or gangrene, and removal of the septic focus leads to immediate and permanent improvement. Owing to the lessened reaction of a diabetic patient to infection, and consequent rapid spread of the infection accompanied by a paucity of symptoms and signs, early operation is necessary. The pathology is often far more severe than the symptoms would indicate.

The diabetic patient, however, is not any too good a surgical risk. Diabetes occurs largely in the older age-groups and in itself predisposes to vascular disease, so the sufferer is apt to be even more damaged than his diabetes and superimposed infection would indicate.

Jones, McKittrick and Root lay down five rules which should eliminate most of the extra hazard in operating on diabetics: (1) comprehensive coöperation between the surgeon and internist; (2) careful pre-operative study and preparation of the patient; (3) judicious selection of the anesthetic and the operation; (4) vigilant post-operative care by the internist as well as by the surgeon; (5) use of insulin.

The diabetic patient is undoubtedly not so good a surgical risk as the average, but his great need for operative removal of septic foci and response following operation more than offset the danger.

1 Jones, McKittrick and Root: J. A. M. A., 1925, 85, 809.

THE PEDIATRIC STAGE

THE medical literature of the day brings more and more forcibly to our attention the fact that the prevention of disease and the improvement of health is now holding the center of the pediatric stage. Pediatrics is not so much a specialty as it is a subdivision of general practice—a subdivision that is practiced almost as much by the family physician as it is by the pediatrician. As such it is blazing a trail that the general practitioner must soon follow in the conduct of his adult as well as of his children's practice.

The editorial section of the *London Medical Press and Circular* of September 23 is entirely given over to an analysis of the discussion of certified feeding of infants that took place in April at the House of the Royal Society of Medicine in London. Various views were presented, ranging from the contention of Findlay of Glasgow that undiluted cow's milk is probably the best substitute for human milk, to that of Dr. Eric Pritchard who believes that cow's milk should be "humanized"—made to resemble human milk—as far as possible. Many intermediary theories were advanced, a common meeting ground being the general agreement that milk for the bottle should be boiled, not only to render it safe but to make more digestible. We thus find that all the discussers agreed on the most important point as far the prevention of sickness is concerned.

The leading article of the same issue is Part I of a paper on the treatment of the nervous child by Harry Campbell, M.D., F. R. C. P., London. The selection of an infant's diet as practiced by the author is of interest and should be enlightening to the advocate of ultra dilutions of cow's milk and cereal gruels. Dr. Campbell accepts

the appearance of the lower incisor as an indication for hard food to bite, and of the upper incisors for the addition to the diet of raw vegetable food. He summarizes the advantages of such a diet as follows:

"It allows the masticatory instinct to develop normally.

"It secures proper development of the jaws, nasal passages, tongue and salivary glands, and enables the teeth to take up their normal position without jamming.

"It obviates care of the teeth.

"It promotes normal gastro-intestinal digestion, and in this way lessens the tendency to catarrh, adenoids, enlarged tonsils and appendicitis.

"It promotes a healthy condition of the blood, sound nutrition, and a feeling of exuberant health.

"It engenders a healthy appetite and gives the child more real satisfaction than can be obtained from the daintiest of foods."

The detail of his diet and regime we have not taken up; it is obvious that the principles tend away from the frappy foods and over coddling that have been the products of civilization. Radical, one may exclaim? Certainly, but have we any evidence that a method of care productive of so many of our better class children, delicate, undernourished, subjects to cold, their mouths filled with dentists' devices cannot be improved upon in almost any manner?

On our desk at the same time is the *New York State Journal of Medicine* for October containing as its three leading articles "Prevention in Pediatric Practice," by J. H. M. Knox, Jr., of Baltimore; "Mental Hygiene of the Child and Its Relation to Medicine," by D. A. Thom of Boston, and "Mental Hygiene of the Child and Its Relation to the Development of Character," by Ira S. Wile of New York. From these titles our eyes naturally wander to *The American Child Health Association's* report of its health survey of 86 cities, and a bound volume of service monographs from the United States Government Children's Bureau.

We are beginning to appreciate the value of a commodity the supply of which is tending to diminish. Ultra civilization is antagonistic to Nature's old principle of over-production and the survival of the fittest. We must husband our resources and try to improve quality at the expense of quantity. Preventive medicine is already the mainspring of Pediatrics and the time is approaching when it will become the driving power of the other branches of medicine.

AN OFFENSIVE QUESTION

Questionable Medical Jokes

The Journal of the American Medical Association of October 10, 1925, on page 26 of the advertising section, publishes an allegedly humorous criticism of a statement which appeared in the Boston Medical and Surgical Journal. The sentence in question states a fact in plain and correct English. Some would-be humorist with a flair for the salacious seeks to arouse a laugh by commenting upon it in a manner which is all too suggestive of barnyard wit.

The profession of medicine is a serious one, and it is well to lighten the path by wit and humor whenever possible. Many amusing incidents occur, and when their humor is due to true wit they may be passed along. When their only claim to a laugh depends upon a salacious interpretation, they should not be published in a periodical which aims to represent the highest and best in medical thought. We have felt at times mildly surprised when seeing some statements in the column devoted to mirth and satire in *The American Medical Association Journal*. The line between true wit and obscenity should be clearly drawn.

We welcome decent and logical criticism of this Journal. If *The Journal of the American Medical Association* encourages other types we are content to go our way without its approval.

THIS WEEK'S ISSUE

Contains original articles by the following named authors:

Benedict, Francis G., A.B., Harvard; Ph.D., University of Heidelberg; Sc.D., Wesleyan University; Director of Nutrition Laboratory of the Carnegie Institution of Washington, Boston, Mass.; Fellow of the Academy of Arts and Sciences. He writes on "Some Techniques for Measurement of the Gaseous Metabolism of Humans."

Stuart, Harold C., M.D., Columbia University College of Physicians and Surgeons 1918; Instructor in Pediatrics, Harvard Medical School; Assistant Visiting Physician, Infants' Hospital, Boston; Assistant Physician Children's Hospital, Boston; Member of New England Pediatric Society. His subject is "Teaching in Out-Patient Clinics."

Heffernan, Roy J., M.D., Tufts College Medical School 1917; Visiting Surgeon, Gynecological O. P. D. Carney Hospital; Assistant Visiting Obstetrician Evangeline Booth Hospital. His subject is "Uterine Rupture at Term After Previous Caesarean Operation."

The Massachusetts Medical Society

MEMBERSHIP CHANGES

Dr. C. Guy Lane has moved from Woburn (Middlesex East) to Cambridge (Middlesex South), office Boston, 416 Marlborough Street.

Dr. Louise M. Leverone has moved from Boston (Suffolk) to Keene, N. H. (Non-Resident List). Her address is 82 Spring Street.

Dr. Monroe A. McIver has opened an office for private patients by appointment, at the Massachusetts General Hospital, Boston.

1906 } Miner, Harold Edson, Holyoke, 65 Columbus
1925 } Avenue. Restored by the Council, October 7, 1925.

Dr. John R. White has moved from Manila to San Francisco, Calif., where his address is U. S. Naval Receiving Ship.

MISCELLANY

ETHER DAY EXERCISES AT THE MASSACHUSETTS GENERAL HOSPITAL, OCTOBER 16, 1925

In commemoration of the great event of October 16, 1846, when the anaesthetic properties of sulphuric ether were demonstrated in the Massachusetts General Hospital, following the custom of many years, the Hospital arranged a program consisting of clinical meetings during the forenoon and an oration in the afternoon.

The exercises of the clinical meeting in the Surgical Amphitheatre were as follows:

10:00—Iodine in the Surgical Treatment of Exophthalmic Goitre, Dr. E. P. Richardson.

10:08—Some Urological Causes of Abdominal Pain, Dr. J. Dellinger Barney.

10:20—Classification of Cancer of the Breast According to Degree of Malignancy, Dr. R. B. Greenough.

10:32—The Whitman Operation for Ununited Fracture of the Hip, Dr. Philip D. Wilson.

10:38—Demonstration of a Case of Arthroplasty of Hip, Dr. M. N. Smith-Peterson.

10:44—Roentgen-Ray Diagnosis of Gall Bladder Lesions Following Tetraiodophenolphthalein, Dr. G. W. Holmes.

10:56—Two Cases of Extensive Epithelioma Developing in Burns, Dr. C. A. Porter.

11:00—Cerebro Spinal Fluid in the Differential Diagnosis of Acute Infections of the Nervous System, Dr. Frank Fremont-Smith.

11:20—Plasma Volume in Myxedema and the effects of Thyroid Treatment thereon, Dr. W. O. Thompson.

11:30—Studies on Adrenal Cortex, Dr. Walter Bauer.

11:40—Study of one hundred fifty Cases with Reference to Relation between Gastric Ulcer and Cancer of the Stomach, Dr. J. S. Lawrence.

11:50—The Retention of Uric Acid in starvation, Dr. W. G. Lenox.

Surgical Operations were conducted in the small Operating Rooms from 9:00 A. M. till 1:00 P. M.

At three o'clock Dr. Henry P. Walcott called the assembly to order and referred to the celebration of the day as a festival for which the Hospital family and friends gathered to enjoy the social features and renew acquaintances. He referred to the year 1821 when the first patient was admitted and after briefly alluding to the use of ether, argued that no one event should be regarded as the greatest in any institution but that however impressive it might be, it should stimulate growth and progress by the acquisition of knowledge, and through its application, promote greater service. He felt that each year brings some new responsibility which should be accepted as an addition to the burden laid upon our shoulders in 1846. The great problem of hospital administration seemed to him to be the development of service to the self respecting person of limited means who, although desirous of meeting financial obligations, cannot pay the necessary cost of sickness under present conditions.

Although some assistance had been given to the Hospital through legacies, much larger resources must be provided if the Hospital is to do all that may be expected of it.

He then asked Dr. Washburn to read the names of the House Officers graduated during the year from October 16, 1924, to October 16, 1925. The list is as follows:

MEDICAL

East—Walter Wendell Fray, Wyman Richardson, Arthur M. Walker, Elmer Hinckley Heath, Jr.

West—Stafford Leak Warren, Walter Stuart McClellan, John Seward Lawrence, Lewis Marshall Hurxthal.

SURGICAL

East—William Waugh Haggart, Arthur Perkins, Franklin Greene Balch, Jr., Horatio Rogers.

West — Harry Irving Bixby, Paul Edwin Spangler, William Lionel McClure, Channing Stearns Swan, Charles Edmond Teel.

ORTHOPEDIC

Frederic George Linde, Dennis Stanislaus O'Connor, Jennings Meade King, Jr., Joseph Patrick Derby, Vernon Percy Thompson.

CHILDREN'S MEDICAL

Merrill Collins Jobe, Ralph Trafton Ogden, Robert Norton Ganz.

In introducing the speaker, Dr. Walcott spoke of the remarkable address delivered by Dr. W. W. Keen at the time of the 1915 celebration of Ether Day and expressed his pleasure in being able to present as the orator of the day, Dr. John H. Gibbon of Philadelphia, who was a pupil, assistant and associate of Dr. Keen.

Dr. Gibbon's scholarly address under the title "The Influence of the Boston Profession on American Medicine" was very much enjoyed. This will be published in this JOURNAL at a later date.

ADDRESS AT THE HARVARD MEDICAL SCHOOL

THE fourth of the series of lectures on "The Care of The Patient" was held on Thursday afternoon, Oct. 15th, in Harvard Medical School. Dr. Francis Peabody addressed a large gathering of physicians and medical students. He stressed the importance of a close personal relationship between doctor and patient, whether in hospital or private practice. Following are some of his ideas of the doctor's responsibility in the care of the patient.

"Taking care of a patient means more than treatment of a specific disease."

"Treatment of the disease may be impersonal, but the care of the patient must be personal."

"Hospitals are apt to deteriorate into dehumanized machines."

Hospitalization removes patient from his accustomed environment. It is important for the doctor to know thoroughly what that environment is. In the hospital we tend to use the oil immersion lens instead of low power. We focus too intently on the centre of the field. Our attention is on the disease, not the patient. He loses his identity and is referred to, for example, as "that case of mitral stenosis in the second bed on the left."

"Because he is an interesting case, he doesn't cease to be a human being with human hopes and feelings."

"As long as the patient represents a diagnostic problem we are interested. When we find no organic pathology, we lose interest."

Some may say that modern doctors are too scientific because of the elaborate laboratory technique now employed in medical practice. It would be more correct to say that they are not scientific enough. "A scientist is known, not by his technical processes but by his intellectual processes." A large percentage of patients have symptoms that are not dependent on organic disease. Most of them come under the heading of psycho neuroses. The tendency is to disregard them as unimportant cases. "They are not serious cases as regards prospective life and happiness. Their symptoms arise from physiological disturbances. These are often due to nervous influences emanating from the emotional and intellectual life. Such an origin does not make the symptoms any less real. A nervous headache may be as painful as one due to a brain tumor.

Most of these cases belong to the field of general medicine and the majority can be straightened out by the internist without calling upon the highly specialized technique of the psychiatrist.

It is important that students be given an opportunity to build up a personal relationship with patients while in school. The first doctor to see the patient entering the hospital is in a strategic position. By the clinical system here, the medical student is often the first to see the patient. He must seek to build up the patient's environmental background so that he may enter into close personal relationship with him.

If this intimate relationship is essential in diagnosis, it is doubly so in treatment. We must not neglect the emotional factor in treatment of the patient. The doctor must dispense time, sympathy and good cheer with a lavish hand, if he would really get to know his patients and their problems and be in a position to treat them most efficiently.

"The secret in the care of the patient is caring for the patient."

THE CHILDREN'S BUREAU

THE Institute for Government Research, "an association of citizens for coöperating with public officials in the scientific study of government with a view to promoting efficiency and economy in its operations and advancing the science of administration," has recently published No. 21 of the Service Monographs of the United States Government, prepared by James A. Tobey. We would venture a guess that few citizens know of the histories and activities of the various government bureaus; any attempt to increase general information on such subjects is worthy of commendation.

The Children's Bureau was established by an Act of Congress approved April 9, 1912, its duties being to "investigate and report . . . upon all matters pertaining to the welfare of children and child life among all classes of our people, and . . . especially to investigate the question of infant mortality, the birth rate, orphanage, juvenile courts, desertion, dangerous occupations, accidents and diseases of children, employment and legislation affecting children in the various states and territories."

The original suggestion for the bureau is due to Miss Lillian D. Wald, head of the House on Henry Street in New York City, and the plan was formulated by Mrs. Florence Kelley of The National Consumers' League and supported by the National Child Labor Committee.

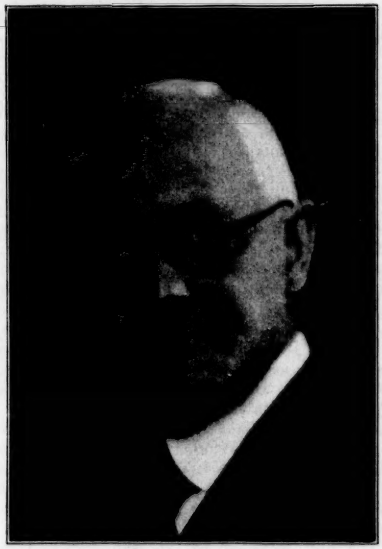
The first work of the Bureau consisted in infant mortality studies, to which have been added such tasks as the administration of the first Federal child labor law, special war work, with registration, the publication of popular pamphlets, studies on rural child welfare, national mortality, child labor, illegitimacy, etc. A share of the administration of the Maternity and Infancy Act of 1921 also has become one of the duties of the Bureau.

The work of the Children's Bureau is carried on through the following administrative units:

Office of the Child
Office of the Assistant to the Child
Social Service Division
Child Hygiene Division

Industrial Division
Editorial Division
Statistical Division
Maternity and Infant Hygiene Division.

One of the duties of the Federal Government is, through its various bureaus, to investigate and advise. It has been a frequent political observation, however, that advisory boards are not slow in seeking power. A bureau that investigates and reports, that advises and educates and wisely uses its appropriation is a sign of political progress. It must not be forgotten, however, that our government, held up as a model of democracy is rapidly becoming a government by bureaucracy; that the most independent people on earth are becoming the most governed.



DR. WILLIAM HERBERT BRADFORD, M.D., F. A. C. S., PRESIDENT OF THE NEW ENGLAND SURGICAL SOCIETY

Dr. Bradford was born in 1866, is a graduate of the Bowdoin Medical School. He practices in Portland, Maine. His office is at 208 State St.

THE EXISTING KNOWLEDGE OF CANCER

THE information which exists today in regard to cancer is not only more extensive but of more practical value than many persons suppose. It is sufficient, if put into effect, to reduce the present death toll by one-half among women and one-third among men. At least this is the opinion of Dr. Charles P. Childe, President in 1923 of the British Medical Association, a distinguished student of the cancer problem.

If we apply this estimate to the number of deaths from cancer which occur among men and women in the United States, we shall find that over 40,000 people perish needlessly from this disease each year in this country. In other words, according to Dr. Childe's opinion, the lives of over 40,000 men and women, most of them fathers and mothers, many of them in the prime of life and at the period of their greatest usefulness, are annually sacrificed to the failure to turn the knowledge which exists concerning the prevention and cure of cancer to account.

RUSH MEDICAL COLLEGE ALUMNI TO RAISE $250,000 FOR THE UNIVERSITY OF CHICAGO

UNDER the leadership of Dr. Ralph W. Webster, of Chicago, a nation-wide committee of doctors has been organized to raise a fund of $250,000 as a contribution from Rush Medical College alumni toward the general development funds of the University of Chicago. Announcement of the committee has been made by Dr. Wilber E. Post. Dr. Webster is in Japan with the University of Chicago baseball team.

This sum of $250,000 to be given to Rush doctors will be part of the $2,000,000 which alumni of the University are raising and which is to go toward the comprehensive program of construction and endowment covering the immediate needs of the institution. Rush men already have pledged $155,000 toward their quota, leaving $95,000 to be pledged. Of this $95,000, Rush alumni in Chicago will raise $70,000. The balance of $25,000 will be raised by doctors outside the city.

The University's program of immediate needs will cost $17,500,000, of which $6,500,000 has already been raised in addition to $2,400,000 in gifts which have not been credited to the program.

Well known doctors throughout the country are members of the national committee, of which Dr. Webster is head. The committee for the city of Chicago is as follows: Dr. George H. Coleman, chairman; Dr. Morris Fishbein, Dr. Earl B. Fowler, Dr. Frank B. Kelly, Dr. Edwin Morton Milfer, Dr. Wilber E. Post, Dr. Carl O. Rinder, Dr. David C. Straus, Dr. Theodore Tieken, Dr. Frank Billings, Dr. E. V. L. Brown, Dr. Ernest E. Irons, Dr. Ralph W. Webster, Dr. William G. Hibbs, Dr. E. R. LeCount, and Dr. Vernon David.

Dr. Post explained the situation in the following words:

"By its union with the University of Chicago, Rush Medical College is to take a prominent part in a program of medical development which will have an enormous influence on medical education and scientific research.

"The medical school at the campus of the which Rush is now a part, will be able to control their policies of education and adapt them to the best developments in medicine.

"The medical school at the campus of the University and the new Albert Merritt Billings Hospital will be so arranged geographically that there will be a close and favorable association with the fundamental sciences of chemistry, physics, mathematics, biology, pathology and other important departments of the Ogden School of Science, with teaching and investigation in the wards and laboratories of the hospital and in the outpatient department.

"A great program of postgraduate medical education will be carried on in the new buildings of Rush on the West Side, the Presbyterian Hospital, the Central Free Dispensary, the John McCormick Memorial Institute for Infectious Diseases, the Children's Memorial Hospital, the Home for Destitute Crippled Children, the Cook County Hospital, and the Country Home for Convalescent Children. In this postgraduate phase of the program of the medical schools of the University, Rush will take a dominant part."

EDUCATIONAL MATERIAL

Massachusetts Department of Public Health

Working on the theory that attractive presentation of a subject teaches its lesson most quickly and thoroughly, the Massachusetts Department of Public Health has to offer a wide range of health educational material.

For LOAN without charge to citizens of Massachusetts

24 health motion pictures
20 sets of lantern slides
5 delineascope films

Posters, for younger children, on health habits; for mothers, on child care.

For FREE DISTRIBUTION to citizens of Massachusetts

Technical Pamphlets—for physicians, nurses, and teachers.

Popular Leaflets—for the laity.

THE APPOINTMENT OF DR. GEORGE H. BIGELOW

The Governor has nominated and the Council has confirmed the nomination of Dr. George H. Bigelow as Commissioner of Health for the State of Massachusetts to fill the vacancy caused by the death of Dr. Eugene R. Kelley.

Dr. Bigelow has had an unusual experience in various departments of Public Health activities after having prepared himself by special study for this work.

The daily papers have reported that Dr. Bigelow has been in conference with Governor Fuller and the State Department of Administration and Finance but Dr. Bigelow has not up to the time of this writing accepted the position.

Although we have no authority to speak for Dr. Bigelow, it is suspected that the problems which annoyed Dr. Kelley may have some influence on Dr. Bigelow's decision. We hope that the way may be made clear for Dr. Bigelow's acceptance of the appointment.

MEETING OF THE CLINICAL STAFF OF THE BOSTON DISPENSARY

Addressed by Dr. Francis D. Donoghue

The third of the special meetings of the Clinical Staff of the Boston Dispensary was held on Tuesday, October 20th, in the Medical department. Dr. Francis D. Donoghue, Medical Adviser, Massachusetts Industrial Accident Board, addressed the meeting on the topic: "Industrial Accident and Health Activities—The part the dispensary and out-patient department can play in the successful working out of the general purpose of such enactments." Dr. A. K. Paine in introducing Dr. Donoghue said:

Dr. Donoghue has done a large part in bringing about the present form of the Massachusetts Compensation Act. He recently returned from Holland, where he was sent as a delegate by President Coolidge, to the international conference on industrial health problems.

Following is an abstract of Dr. Donoghue's address at the dispensary.

Nearly all workmen's compensation laws are purely "accident" laws. The law in Massachusetts is broader in its scope. It provides that any employee who receives injury arising out of, and in the course of his employment is eligible for compensation. The word "injury" is construed liberally. It includes lead poisoning. A case of a painter was diagnosed as "Lead poisoning" but no compensation could be obtained, because the company proved that there was no lead in their paints for the previous seven years. However, this did not exclude the possibility of other poisons being present in the paints. This illustrates the importance of making the broader diagnoses in order to safeguard the rights of the workman.

Under the State Act, the rates of payment are fixed. Not less than seven dollars per week and not over sixteen per week must be paid. Neither shall the compensation exceed two-thirds of the workman's wages. Sixteen dollars was enough

in the early years of the Act, but it is a grossly insufficient amount in these days of high prices. If there are no dependents the death benefits only provide for funeral expenses and the doctor's bill. If there are dependents the insurance companies are responsible in proportion to the degree of dependency of the family.

The law provides that all insurance companies can write insurance under the act. In some instances the employers wanted the right to write insurance on their employees, but the board refused to approve this. Under such an arrangement, if the company were to fail all the money from premiums would be lost to the workmen. The rates of the insurance companies are fixed by the Insurance Commissioner and they must pay whatever compensation, the board decides should be paid.

Under the original law the insurance companies were required to provide the treatment. In 1914 the law was amended so that a workman had free choice of doctors. A man can choose his own doctor for the first two weeks that he is incapacitated and for a further period in the discretion of the Industrial Accident Board.

The maximum amount that has been paid for treatment is $7000. The doctor is the party concerned in the act, that so far has not felt that he should make any concession. He wants his full fee. The medical costs in the working of the act are twenty-seven per cent of the premiums paid. During twelve years of operation of the act $9,000,000 have been paid to dependents; $33,000,000 to the injured workmen and $15,500,000 to doctors. The board may refuse to pay a doctor's bill which it considers unjust. In 1914, doctors were given the right to have hearings on their bills under the act, but there was to be no appeal. The State can make evidence by appointing an impartial man to make the examination. These appointments should be made with great care.

The effort has been to pick out medical examiners on the basis of their technical skill. They have been appointed after a consideration of the Medical situation and by advice of the most competent Medical authorities in the State. Under our law the malingerer is almost unknown. Usually there is some reason for the inability to work. The workman should be sent to an examiner who is skilled in the particular line of his ailment. The examiner who makes the diagnosis of malingering is apt to be considered inefficient.

A very important work is being done by the Department of Labor in reducing industrial accidents. Better lighting around dangerous machines and the introduction of other safety measures have done much in this direction. There were 193,000 accidents in Massachusetts during 1920, and only 149,503 during the past year.

There are many things the Dispensary and Hospital can do to safeguard the rights of the workman and to insure a minimum loss of time from work when incapacitated. Careful supervision and adequate treatment are necessary if all parties concerned are to have a square deal. In cases that must stay in the hospital the State Board pays the institution a maximum of twenty-one dollars a week. The hospitals complain that this is not enough. There is a general feeling in the medical profession that general hospitals should not care for a person able to pay for private service, and they feel that an insured person comes within that category.

Hospitals should be regarded as public service corporations and not charitable institutions. In providing adequate care for the injured workmen they are rendering a real public service. The visiting man should give the workman special attention and should also keep a record on the basis of which the workman could get his rights. One difficulty in the way, is the fact that the visiting man has too many beds. He hasn't time to do the actual diagnosis and treatment in many cases. That is left to the staff officer.

The dispensaries and out-door departments play their part in giving the workman the definite treatment that he requires after leaving the hospital. These institutions should not be competitors of the general practitioner. Their work is among those who are unable to pay large fees for medical service.

Several industrial clinics are in operation in the State, by an agreement between the management of the industry and the insurance companies. These clinics charge a fixed rate. One of these, which is conducted by a large concern in Lynn, is rendering an excellent service.

Dr. Donoghue felt that one difficulty of the medical profession with regard to the Workmen's Compensation Act, was the lack of thorough knowledge of the law.

Dr. Frederic J. Cotton opened the discussion on Dr. Donoghue's address. He considered that conditions were much improved from the doctor's point of view. Industrial medicine and surgery are important factors in giving young doctors a start. Many of them have improved their financial status in this field. There is no need of the doctors complaining about industrial cases. On the whole the doctors have been pretty well treated.

Hospitals haven't worked out satisfactory solutions of the problems of industrial injuries. The care is not as it should be. Accident room care especially, isn't what it should be. The

same is true of after treatment in the out-patient departments.

Hospitals are too dependent on unpaid help and hurried help. They are seldom run with a real, clear purpose in view. Insurance companies have established clinics of their own in some instances and they are doing good work, perhaps they are doing better than the hospitals. They found it profitable to furnish proper treatment for the workman, thus insuring his early return to his position. In the hospital the definite problem of getting the patient back in shape is not the first thing considered. There is still a large amount of sepsis in hospitals and sepsis is one of the biggest factors in relation to industrial loss. The accident room is not considered as important as it really is. The work often falls into unexperienced hands. A lot of routine outpatient work is done in the same way.

Men must be trained to handle cases of accident and disability from the point of view of early return to work and efficiency. We need experts in the hospitals who can impress their point of view on the members of the staff. If hospitals and doctors will do their work more efficiently, the working of the Compensation Act will be more just and fair for all concerned.

HARVARD MEDICAL SCHOOL

A MEETING of the Faculty of Medicine was held in the Faculty Room on Friday, October 2nd, at 5 o'clock.

Medical School Appointments as of Oct. 18, 1925.

New Appointments: for one year from September 1, 1925: John Ignatius Bradley, M.D., Assistant in Anatomy; Lawrence Wells Sloan, M.D., Assistant in Anatomy; Cecil Crafts Cole, A.B., Assistant in Comparative Anatomy; Robert Edward Fleming, B.S., Teaching Fellow in Histology; Elroy Franklin Sheldon, A.M., Teaching Fellow in Histology; Fei-fang Tang, M.D., Research Fellow in Bacteriology; James Hitchcock, M.D., Assistant in Medicine; Millard Smith, M.D., Assistant in Medicine; Henry Stone Forbes, M.D., Research Fellow in Neuropathology; Henry Pinkerton, M.D., Instructor in Pathology; Shields Warren, M.D., Instructor in Pathology; Frank Seymour Davenport, B.S., Teaching Fellow in Physiology; Wyman Whittemore, M.D., Instructor in Surgery; William Lionel McClure, M.D., Alumni Assistant in Surgery; William Alexander Rogers, M.D., Assistant in Surgery; Horace Kennedy Sowles, M.D., Assistant in Surgery; Charles Edmond Teel, M.D., Assistant in Genito-Urinary Surgery.

New Appointment: From November 1, 1925, to September 1, 1926: Tracy Jackson Putnam, M.D., Arthur Tracy Cabot Fellow in charge of the Laboratory of Surgical Research.

New Appointment for six months from November 1, 1925: Willard Owen Thompson, M.D., Research Fellow in Medicine.

Reappointments: for one year from September 1, 1925: Carl Edward Johnson, A.B., Assistant in Histology; Maurice Fremont-Smith, M.D., Assistant in Medicine; Harry Caesar Solomon, M.D., Instructor in Neuropathology; Donald John MacPherson, M.D., Assistant in Neuropathology; Frank Fremont-Smith, M.D., Assistant in Neuropathology; William Gordon Lennox, M.D., Research Fellow in Neuropathology; George Hayward Binney, M.D., Assistant in Surgery; Grantley Walder Taylor, M.D., Assistant in Surgery.

Reappointment: from September 1st to November 1, 1925: Lester Ray Whitaker, M.D., Arthur Tracy Cabot Fellow in charge of the Laboratory of Surgical Research.

Reappointment: from August 1, 1925, to February 1, 1926: Albert Aurelius Hornor, M.D., Assistant in Tropical Medicine.

DAVID L. EDSALL, *Dean.*

RECENT DEATH

WOODWORTH—DR. WILLIAM SOMMERVILLE WOODWORTH, a graduate of Harvard Medical School in the class of 1873 and a former Fellow of the Massachusetts Medical Society, died at his home in Kentville, Nova Scotia, July 22, 1925, aged 77.

OBITUARY

DR. THOMAS EZRA GUILD died at the Peter Bent Brigham Hospital Oct. 9th, 1925. He was born in 1868, graduated from the University of Vermont 1892. Licensed in Massachusetts in 1896 and began practice here. Was a member of the Norfolk District division of the Massachusetts Medical Society, of the American Medical Association and of the Physicians' Club of Dorchester. This month saw the completion of thirty years of general practice in the Mattapan Section of Dorchester.

Dr. Guild was a real general practitioner of the old school, loved and respected by his friends and associates alike.

Interment was in Cedar Grove Cemetery.

FRANK S. CRUICKSHANK, *Secretary.*

CORRESPONDENCE

LONDON LETTER

(*From Our Own Correspondent*)

London, September 10, 1925.

IMPROVED POSITION OF LONDON HOSPITALS

A statistical report for the year 1924 on 115 London hospitals has been issued recently by the King Edward's Hospital Fund for London. The report shows:

(a) A continued increase in the work of the London hospitals, the total available beds being 13,460 in 1924, an increase of 350 over 1923 and 1,620 over 1913. This is especially interesting in view of the report issued recently by the Voluntary Hospitals' Commission on the question of extension.

(b) A continued increase in maintenance expenditure, the total being £2,756,000 ($13,165,000) in 1923 and £1,204,000 ($6,020,000) in 1913.

(c) A continued increase in income, which was £2,918,000 ($14,590,000) in 1924, as against £2,860,000 ($14,300,000) in 1923 and £1,455,000 ($6,225,000) in 1913.

(d) A remarkable improvement in the financial position since the crisis in 1920, whereby the net aggregate deficits (taking all the hospitals together) for the years 1920, 1921 and 1922 have been changed gradually into net surpluses for the years 1923 and 1924 and the number of hospitals with deficits has decreased from 77 in 1920 to 54 in 1924; and

(e) In addition to the increase in income, very large sums were received for capital purposes during the past three years, viz., for endowment, £643,000 ($1,315,000), and for buildings and equipment, £810,000 ($4,050,000). Among other points of special interest is the proportion of expenditure covered by each kind of income—20.1 per cent. by income from investments amounting to £554,000 ($2,770,000); 37.7 per cent. by voluntary gifts amounting to £1,039,000 ($5,195,000); 29.8 per cent. by patients' payments and other earnings amounting to £820,000 ($4,100,000); and 15.3 per cent. on £505,000 ($2,525,000) by legacies and other extraordinary income; the surplus of income over expenditure being 5.9 per cent.

NEW WORK ON INSULIN

At the meeting of the British Association which was held in Southampton at the end of August, Professor J. R. R. Macleod of Toronto read a paper on Carbohydrate Metabolism in Cold-Blooded Animals. In it he said that insulin had been of inestimable benefit in the treatment of diabetes. It had not only prolonged life but had also improved the efficiency and comfort of the patients. Its discovery, however, had not revealed the cause of the disease. Insulin showed what prevented diabetes, but we had still to find out why diabetes occurred when it was not present in the body. It furnished a key which might unlock the door to a discovery of the cause, but we did not know how the key should be turned. In order to explain the line of attack on this problem the experimental station of the Biological Board of Canada had made experiments on the behavior of sugar in fish, as the latter were cold-blooded. The changes were much slower in the intermediate stages than they were in the case of mammals and could be more closely followed. All fish had about the same amount of sugar in the blood as men and other mammals, and the amount increased under some experimental conditions. This indicated that its changes in the body must be controlled in the same way. The fish must, therefore, possess insulin, and it had been found that this was secreted by special glands near the gall bladder. On the other hand, the pancreas, which was the source of insulin in mammals, did not produce it. Now these special glands, or principal islets, as they were called, had the same structure as the Isles of Langerhans, thus showing that it must be because of the presence of the structure in the pancreas that the gland yielded it. When the principal islets were excised the blood sugar increased very greatly, showing that the fish were diabetic. Insulin could be prepared very easily from the principal islets, and in countries where the cleaning of fish was done on shore this should be a profitable source of supply. The difficulties of collecting islets when the fish were gutted at sea were so great as to make this an unsuitable source of supply.

Mr. H. P. Marks of London described experiments made at the National Institute of Medical Research, London, into the sugar changes in experimental hyperthyroidism, with the object of investigating the action of the internal secretions on metabolism—namely, the utilization of the nutritive substances taken into the body. The experiments showed that if rabbits were fed with a preparation of thyroid gland, so that excess of thyroid hormone was present in the blood, the liver became over-sensitive to influences which caused it to discharge sugar into the blood. Thus when the blood sugar was lowered by an injection of insulin a compensating mechanism was accelerated and the blood sugar rose rapidly above the normal level. Since the sugar discharged into the blood by the liver was derived from the reserves of glycogen, the excessive discharge of sugar eventually led to the exhaustion of these reserves. At this stage the liver was no longer able to compensate the action of insulin by an output of sugar, as it had no sugar to discharge, and the action of insul increased in severity accordingly. A more striking observation was that at the advanced stage of thyroid feeding. Administrations of sugar were followed by a rapid fall in the blood sugar, which culminated in the death of the animal in hypoglycemic convulsions or collapse. The most rational explanation of these results appeared to be that the administration of sugar stimulated the pancreas to secrete insulin. In the animal whose glycogen reserves had been completely exhausted, the effects of this insulin were fatal, as the liver could not compensate them. When, however, glycogen was available the secreted insulin in turn stimulated the liver to an output of sugar, which maintained the blood sugar at the normal level.

STATUS OF IRISH MEDICAL MEN

There are drawbacks to the accomplishment of home rule for Southern Ireland. The withdrawal of this part of Ireland from the Union with the other nations of Great Britain will have the result of severely handicapping its medical schools. Therefore the decision of the Free State government of Ireland to create a special Medical Register for the 26 Irish counties under its own control seems likely to bring ruin to the Dublin medical schools. Throughout the country, the entire medical profession, irrespective of political opinion, is up in arms against the government's proposal, and Dr. Hennessy, who is the Irish medical secretary to the British Medical Association and also a member of the official government party in Dail Eireann, has made a public protest against it. It may be said that the situation of the Irish medical schools will be very serious if the British Medical Register is lost. During the past 20 years the number of foreign students, notably of South Africa from Stellenbosch and other African universities, has been increasing steadily, and now Dublin rivals Edinburgh as a cosmopolitan medical school. If Trinity College, Dublin, is deprived of the privileges of the British Medical Register these students will undoubtedly transfer their allegiance to Belfast, or some other university where they will be subject to no restrictions. The South African students say that if they cannot have their names on the British Medical Register there is no point in their coming to Europe to study. The Dublin University has also a large number of foreign medical students, including Egyptians and natives from other parts of Africa. Almost without exception these students will be lost to Dublin if the government's plan is carried into operation, and there is a danger that the mere threat of a separate Medical Register may prevent the matriculation of new arrivals at the beginning of the coming academic year.

CONNECTICUT DEPARTMENT OF HEALTH

MORBIDITY REPORT FOR THE WEEK ENDING OCTOBER 10, 1925

Diphtheria	26	Dysentery, undefined	2
Last week	18	Encephalitis epid.	2
Diphtheria bacilli carriers	3	German measles	1
Typhoid fever	10	Influenza	5
Last week	13	Mumps	2
Scarlet fever	23	Paratyphoid fever	1
Last week	27	Pneumonia, lobar	9
Measles	22	Poliomyelitis	1
Last week	22	Septic sore throat	1
Whooping cough	19	Tuberculosis, pulmonary	24
Last week	69	Tuberculosis, other forms	1
Bronchopneumonia	11	Gonorrhea	23
Cerebrospinal meningitis	2	Syphilis	29
Dysentery, bac.	1		

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

DISEASES REPORTED FOR THE WEEK ENDING OCTOBER 10, 1925

Anterior poliomyelitis	12	Pellagra	2
Chickenpox	58	Pneumonia, lobar	45
Diphtheria	79	Scarlet fever	80
Dog-bite requiring anti-rabic treatment	9	Septic sore throat	4
Dysentery	3	Syphilis	38
Encephalitis lethargica	3	Suppurative conjunctivitis	16
German measles	4	Tetanus	3
Gonorrhea	69	Trachoma	2
Hookworm	1	Tuberculosis, pulmonary	106
Influenza	2	Tuberculosis, other forms	20
Measles	196	Tuberculosis, hilum	1
Mumps	11	Typhoid fever	16
Ophthalmia neonatorum	21	Whooping cough	172

CASES REPORTED FOR THE WEEK ENDING OCTOBER 17, 1925

Anterior poliomyelitis	5	Ophthalmia neonatorum	25
Chickenpox	52	Pneumonia, lobar	67
Diphtheria	73	Scarlet fever	124
Dog-bite requiring anti-rabic treatment	2	Septic sore throat	1
Encephalitis lethargica	2	Syphilis	20
Epidemic cerebrospinal meningitis	1	Suppurative conjunctivitis	3
German measles	6	Tetanus	1
Gonorrhea	93	Tuberculosis, pulmonary	93
Influenza	4	Tuberculosis, other forms	15
Measles	267	Tuberculosis, hilum	2
Mumps	12	Typhoid fever	14
		Whooping cough	117

NEWS ITEMS

MEDICAL LIBRARY ASSOCIATION AND HIGH COST OF GERMAN MEDICAL PUBLICATIONS—At the annual meeting of the Medical Library Association held in Atlantic City in May, one of the most important subjects under discussion was the present attitude of the German medical publishers in the high prices charged foreign subscribers for their medical publications and the greatly increased output of their periodicals.

In compliance with the action taken, the executive committee is now making an investigation of this matter. As a result of its findings it is to decide whether or not concerted action on the part of medical libraries of America will cause the German publishers to curtail their output and reduce the cost of their publications to their American customers.

A number of the libraries in the association have donated freely of their duplicates and other organizations have provided subscriptions for American medical publications to aid German libraries and physicians in replenishing their depleted files and in acquiring current literature. It appears from the action of the German medical publishers toward American purchasers of their publications that this evidence of good will and coöperation on our part has been and is little appreciated.

All individual subscribers and purchasers of German medical publications are asked to lend their endorsement to the effort now being made by the libraries. Those willing to join in the movement in order to bring about united action on the part of both libraries and individual subscribers are requested to communicate with Miss Margaret Brinton, Librarian, Mayo Clinic, Rochester, Minn.

ELECTIONS TO THE STAFF OF THE LAWRENCE GENERAL HOSPITAL—George B. Sargent, M.D., of Lawrence, has been reëlected president, and Frederick D. McAllister, M.D., reëlected secretary, of the medical staff, respectively.

W. Holbrook Lowell, M.D., of Boston, has been nominated as consulting ophthalmologist to Lawrence General Hospital.

NEWS ITEMS RELATING TO THE BOSTON UNIVERSITY SCHOOL OF MEDICINE—Boston University School of Medicine opened its 53rd annual session on September 21, 1925. The principal feature of the opening exercises was an address by Dr. Henry M. Pollock, superintendent of the Massachusetts Homeopathic Hospital.

The enrolment in the school this fall is as follows:

	Men	Women	Total
First year	45	12	57
Second year	42	2	44
Third year	45	3	48
Fourth year	45	4	49
Special students	3	7	10
	180	28	208

New departures in connection with the teaching program include the inauguration of clinical exercises for first year students and a choice of elective subjects for the third and fourth year students. The clinical exercises for the entering class are held weekly by heads of the clinical departments, who utilize the information previously obtained by the students in their laboratory work in its clinical application; the idea being to teach the fundamental sciences by means of clinical material. As an example, when the students had completed the dissection of the back and had made a study of the spinal column, the head of the Orthopedic Department gave an exercise on posture. It is the plan to continue these exercises in the second year and to bring about a gradual transition from the laboratory to the clinic, but to maintain at all times the interest in the laboratory. The electives for third and fourth year students include opportunities in all of the sciences and in a few of the clinical subjects.

The Medical School is unfortunate in that it loses this year by resignation the services of Dr. N. Emmons Paine, Professor of Psychiatry, who gives up his work after a period of 38 years of service. Dr.

Winfred Overholser of the State Commission on Mental Diseases has been chosen to continue the work so long carried on by Dr. Paine. Other additions to the teaching force include:

Dr. Edward C. Smith, Instructor in Contagious Diseases and Pediatrics.

Dr. Bernard I. Goldberg, Instructor in Pharmacology and Assistant in Cardiology.

Dr. Charles Sziklas, Instructor in Physical Diagnosis.

The clinical work in medicine at the Boston City Hospital will be under the immediate direction of Dr. John Foley, as Assistant Professor of Clinical Medicine. With Dr. Foley will be associated Dr. Dwight O'Hara and Dr. Edward Walsh.

At the opening of the school year it was necessary to arrange for the physical examination of approximately 700 students at the College of Business Administration, who are potential members of the Reserve Officers' Training Corps. These examinations are very complete and have been conducted by the fourth year students under the direction of members of the staff who hold commissions in the Medical Section of the Officers' Reserve Corps. Two years ago arrangements were made for the physical examination of all students who entered the Medical School. These include the usual physical examinations and are supplemented by vital function tests and certain other laboratory procedures which enable those in charge to make a pretty thorough evaluation. Both groups of physical examinations have been very illuminating. They have revealed unexpected defects in a considerable number, and in the case of the medical students the "follow-up" has been quite successful in correcting these defects. When defects are found in the candidates for the Reserve Officers' Training Corps, each student is informed of the findings by the examiners in charge and is told to consult his physician. In certain cases the parents have likewise been advised by the Dean of the College of Business Administration.

The correlation work is being more carefully scrutinized than ever before, with the emphasis placed upon an attempt to satisfy the students for the practice of general medicine.

PENNSYLVANIA MEDICAL SOCIETY — At the 75th anniversary meeting of the Medical Society of the State of Pennsylvania, held at Harrisburg, October 6-8, Dr. Richard P. Strong of the Department of Tropical Medicine of Harvard University delivered an address in medicine upon the subject of "Spirochaetal Infections of Man."

NOTICES

BOSTON CITY HOSPITAL

Service for Tropical Diseases

Special efforts are now being made to enlarge the usefulness of the Service for Tropical Diseases, which was established here four years ago, and which is conducted by Doctors George C. Shattuck and Albert A. Horner.

Suitable cases are admitted to the beds of this Service for diagnosis and treatment, whether or not they are citizens of Boston, and a special clinic is held for them on Tuesday mornings in the Out-Patient Department.

To avoid delay, patients should bring a note saying that they have been referred to the Service for Tropical Diseases.

The appended list includes the diseases which are treated by this Service.

List of Tropical Diseases

Beri-beri, Blastomycosis, Climatic bubo, Deer-fly fever (or Tularemia), Dengue, Elephantiasis, Filariasis, Inguinal Granuloma, Madura Foot, Malta Fever (Undulant Fever), Myiasis, Pellagra, Rat-bite Fever, Scurvy (adult), Sprue, Tropical Ulcer (or Phagedenic Ulcer), Typhus Fever, Yaws (or Framboesia).

Dysentery: (a) Amoebic; (b) Bacillary; (c) Infusorial Dysentery: Giardia (or "Lamblia"), Trichomonas, Balantidium.

Fluke Diseases: (a) Bilharziosis; (b) Clonorchiasis; (c) Paragonimiasis (or Endemic Hemoptysis).

Hookworm Disease (or Uncinariasis or Ankylostomiasis).

Leishmaniasis: (a) Kala-azar; (b) Oriental sore (or "Aleppo Boil"); (c) South American Leishmaniasis (or "Forest Yaws" or "Uta").

Malaria: (a) Tertian; (b) Aestivo-autumnal or subtertian; (c) Quartian.

Taenia Infections: (a) T. Echinococcus; (b) T. nana; (c) Dibothriocephalus latus; common tapeworms not included.

Trypanosomiasis: (a) African Sleeping Sickness; (b) Chagas' Fever of South America.

UNITED STATES PUBLIC HEALTH SERVICE

Notice of Examination for Entrance into the Regular Corps of the United States Public Health Service

It has been recently announced by Surgeon-General Cumming of the United States Public Health Service that on December 7, 1925, examinations of candidates for entrance into the Regular Corps of the United States Public Health Service will be held at Washington, D. C., Chicago, Ill., New Orleans, La., and San Francisco, Calif.

Candidates must be not less than 23 nor more than 32 years of age, and they must have been graduated in medicine at some reputable medical college, and have had one year's hospital experience or two years' professional practice. They must pass satisfactorily, oral, written and clinical tests before a board of medical officers and undergo a physical examination.

Successful candidates will be recommended for appointment by the President with the advice and consent of the Senate.

Requests for information or permission to take this examination should be addressed to the Surgeon-General, United States Public Health Service, Washington, D. C.

REPORTS AND NOTICES OF MEETINGS

CENSORS' MEETING

There will be a meeting of the censors of the Middlesex South District Medical Society, November 5, at the Colonial Club, 20 Quincy Street, Cambridge, at 2.00 P. M. Applicants

should present their diplomas to the secretary at least one week before the meeting.

STEPHEN M. BIDDLE, M.D., *Secretary.*

BRISTOL SOUTH DISTRICT MEDICAL SOCIETY

THE semi-annual meeting of the Bristol South District Society will be held in the New Bedford Hotel, New Bedford, on Thursday, November 5th, 1925, at 5 p. m.

Speaker, Hon. Hugo A. Dubuque, Justice Superior Court. Subject, "The Medical Witness."

GEORGE E. BORDEN, *Secretary.*

THE PHYSIOLOGICAL CONFERENCE

THE first weekly meeting of the Physiological Conferences will be held in the Bowditch Library of the Harvard Medical School at 4 P. M., Monday, November 2. Professor J. B. Conant will speak on "Some Applications of Oxidation and Reduction of Potentials."

RUTH TYLER,
Secretary of the Department.

MIDDLESEX SOUTH DISTRICT MEDICAL SOCIETY

THERE was a meeting of the Middlesex South District Medical Society, Wednesday, October 28, at the Newton Club. The business meeting was at 11:30 A. M. The paper by Dr. Leland S. McKettrick of Boston, entitled "The Prevention and Treatment of Diabetic Gangrene" was presented with lantern slides. Luncheon was served at 1:00 P. M.

WORCESTER NORTH DISTRICT MEDICAL SOCIETY

THE regular quarterly meeting was held, by invitation, at the restaurant of Brooks Pharmacy, corner Main and Oliver Sts., Fitchburg, Mass., Tuesday, October 27th, at 8 P. M.

Dr. H. D. Chadwick, Supt. of the Westfield Sanatorium, gave an illustrated talk on "Juvenile Tuberculosis."

NORTH SHORE MEDICAL FRATERNITY

AT a meeting of the North Shore Medical Fraternity, held on Tuesday evening, October 20, at Lynn, a paper on Eczema in Infants and its Dietary Treatment was read by Dr. Edward Scott O'Keefe of Boston. The paper was discussed by Drs. Covner, Marcus, Wein, Baker, Sandler, and Levine.

ELLIS MICHELSON, M.D.,
EDWARD SCHÖN, M.D.,
Publicity Committee.

MIDDLESEX EAST DISTRICT MEDICAL SOCIETY

THE seventy-fifth anniversary was celebrated by a meeting of the Society and the wives and guests of the members at the Winchester Country Club on Wednesday, October 21st, 1925.

Addresses were given by Dr. James S. Stone, President of the Massachusetts Medical Society, and Dr. Ernest S. Jack.

WACHUSETT MEDICAL IMPROVEMENT SOCIETY

THE Annual Meeting of the Wachusett Medical Improvement Society was held at Holden District Hospital on Oct. 7th. The regular banquet and routine business was conducted and the officers for the ensuing year elected as follows: President, Dr. G. N. Lapham; Vice President, Dr. T. L. Storey; Treasurer, Dr. H. N. Trask; Secretary, Dr. O. D. Phelps.

A Membership Committee was appointed, consisting of the President as chairman and Drs. F. H. Washburn and E. L. Hunt.

Dr. W. T. Knowlton, by request, repeated his paper on "Lympho-Sarcoma" with report of a case which was read at the previous meeting.

Dr. C. D. Ussher, formerly a Missionary in Turkey, gave a very interesting and illuminating account of his experiences and difficulties in doing medical missionary work among the Armenian people.

The next regular meeting will be held Nov. 4 at the Veterans Hospital, Rutland, Mass., by invitation.

O. D. PHELPS, *Secretary.*

SOCIETY MEETINGS

DISTRICT MEDICAL SOCIETIES

Berkshire District Medical Society

November 9—Regular meeting. The Berkshire Dental Society will be invited to attend.

Essex North District Medical Society

January 6, 1926—The semi-annual meeting at Haverhill.
May 5, 1926—The annual meeting at Lawrence.

Essex South District Medical Society

November 4—Meeting at Salem Hospital.
November 5—Censors' meeting at Salem Hospital at 3:30 P. M.

Middlesex East District Society

November 11—At the Harvard Club at 6:30 P. M.
January 13—At the Harvard Club at 6:30 P. M.
February 10—At the Harvard Club. Time unsettled.
April 14—At the Harvard Club at 6:30 P. M.
May—Annual meeting, Colonial Inn, North Reading.

Norfolk District Medical Society

November 5—Censors' meeting.

Suffolk District Medical Society

October 29—Stated meeting (changed from October 28).
Thursday, November 5—At 4 o'clock, at the Medical Library, No. 8 Fenway, a Censors' meeting will be held.
November 18—Surgical Section.
January 6—Medical Section (meeting postponed from December).
February 24—Surgical Section.
March 31—Medical Section.
April 28—Annual meeting. Election of officers.

Worcester District Medical Society

November 11—Worcester State Hospital.

Notices of meetings must reach the JOURNAL office on the Friday preceding the date of issue in which they are to appear.

BOOK REVIEWS

Operating Room Procedure for Nurses and Internes. By Dr. Henry C. Falk.

As a guide to the pupil nurse, Dr. Falk's book, "Operating Room Procedure for Nurses and Internes," should be of much value during her surgical training. The author might be criticized for over-emphasizing methods of technique, as all institutions and their surgeons have their own methods of technique, many of which vary considerably from those described. A great deal depends upon the intelligence and coöperation of the nurse in carrying out their methods and ideals. A study of Dr. Falk's book should give her a good understanding of the principles of asepsis, and be an aid to her in adapting herself to the procedures of the surgeon. Special mention should be made of the illustrations of operations, as they give a good general idea of the various steps in operative procedures.

The Healing Gods of Ancient Civilization. By Walter Addison Jayne, M.D., University of Colorado. Yale University Press, New Haven, 1925.

In America there is a growing interest in the subject of medical history, largely stimulated by the work of Garrison, whose well-known book on the subject, now in its third edition, although specially rich in its summary of the modern period, is still the best introduction that has ever been written. Garrison's work, combined with the unique resources available in Washington at the Surgeon General's Library, are the main forces in this country which have stimulated research and teaching to medical students of a section of medicine long neglected. Nevertheless, when one considers the potential power of medicine in the United States, its schools and its teachers, the total output is astonishingly small. Studies from the Sudhoff School at Leipzig published as monographs or in the *Archiv für Geschichte den Medizin*, the splendid work stimulated by the Wellcome Historical Medical Museum in London, which has recently culminated in Spielmann's superb *Iconography of Andreas Vesalius*, and the work of Singer at Oxford and the University of London, have all set America a very high standard, a standard that has not been even vaguely reached by any group of workers in this country.

And yet, new American material is appearing slowly and from unexpected sources. Work has been stimulated by Packard's *Annals of Medical History*, by men such as the late Mortimer Frank, Welch, Cushing, Streeter and most of all by Osler, who added so much to the then practically untilled field of American medical history, all of which seems natural in view of the great eastern libraries in Washington, Philadelphia, New York and Boston. It is from a western university, however, that we receive the latest contribution to medical history, a carefully compiled source-book, of inestimable value to students.

Dr. Jayne, who has been a surgeon for many years in Colorado, has found time in, as he says, "the odd moments of leisure from the active practice of medicine," to search diligently into the unexplored field of prehistoric medicine, a time when the art of healing was in "its primitive devotional and mythologic phase, its era of soothsaying and magic." He not only lists the healing deities of Egypt, Babylonia and Assyria, Ancient India and Iran, Greece and Rome, but gives an illuminating survey of each period. The facts, so skillfully gathered, speak for an enormous amount of research into archeological studies, classical authors and commentators. The completeness of his records seems astounding in view of the fragmentary character of many of the ancient sources. Such a book, covering a period of medical history so dimly outlined, will richly serve its purpose if only as a stimulus to further research. Dr. Jayne has been particularly careful of his bibliographical references and his index, both of which add greatly to the value of the book. The volume will find a worthy place beside the products of the European workers. Its publication by the Yale University Press on the McMillan Memorial Fund is a credit to a press long noted for its superior work.

Statistical Methods for Research Workers. By R. A. Fisher, M.A., Fellow of Gonville and Caius College, Cambridge, Chief Statistician Rothamsted Experiment Station. Oliver and Boyd, Edinburgh and London, 1925. IX + 239 pages + 6 Tables, 15s.

R. A. Fisher's Statistical Methods for Research Workers is No. 3 of the series of biological monographs and manuals printed under the general editorship of F. A. E. Crewe of Edinburgh and D. Ward Cutler of Rothamsted. About a dozen monographs are promised in this series with others perhaps to follow.

The author is one of the most distinguished of the younger statisticians in England through his contributions to the theory and practice of statistics. He is a careful and critical worker and not likely to over-estimate the value of his data or to over-draw his conclusions from the data. In fact, no inconsiderable part of his own contributions has been directed toward the revision of estimates of probability that are in more or less current use among statisticians.

He is therefore one of the best persons who could write a book on statistical methods for research workers with least likelihood that his readers would come to exaggerated conclusions by mere formal application of methods he explains and illustrates.

The book is very well written, the topics are

well selected, and the mathematical background which is entirely familiar to the author is suppressed so that it should not annoy the worker not trained in mathematics. The author does not hesitate to express doubts with respect to some of the mathematical functions used in biometric analysis. He points out limitations with respect to the correlation ratio and Blakeman's criterion, and even expresses some doubt as to how far one may use correlation coefficients, not to mention partial correlation coefficients, unless we know or are willing to assume a qualitative scheme of causation.

Modern Operative Surgery. Edited by H. W. CARSON, F. R. C. S., Eng.

This work is one of two volumes, printed by Wm. Wood & Co., N. Y. There are 365 figures or illustrations in the text and two plates. Like Ochsner's Surgical Diagnosis and Treatment, the book is made up by the separate contributions of many different authors. The authors of this work being twenty-four English surgeons.

The editor states in his preface that the work is an attempt to present to the Profession an authoriative survey of the whole range of modern surgical operations, the aim being to exclude operations, including some classical ones, which have lost their usefulness, and among the new operations to include only those which have proved their value. The work is designed primarily for surgeons who desire to be informed as to the detailed technic of modern operations. Especial attention has been taken to deal with the dangers and difficulties arising during or from each operation and something is added regarding preparation for operation and after-care.

Each volume contains a table of contents with authors and an index. The illustrations are very adequate and excellently done. All are by Dr. Georges Dupuy.

This contribution to surgery is well and thoroughly done and one finds very adequate reasons given for the employment of most of the operative procedures advised. Results, gathered from large numbers of cases reported, are convincing. The work forms a valuable and easily handled two volumes for office desk reference. A clearer idea of its nature can be gathered by reading the following tables of contents and the authors.

Volume I. Anaesthetics, J. Blomfield; Conservative Treatment in Surgical Tuberculosis, Sir Henry Gauvain; General Orthopedics, R. C. Elmslie; Operations On Joints, P. J. Verrall; Operations On Tendons, R. C. Elmslie; Amputations, R. C. Elmslie; Fracture Operations, Ernest W. Hey Groves; Operations On The Thorax, Richard Warren; Op-Operations On Nerves, Henry Platt; Vascular Surgery, Hamilton Drummond; Principles Of The Operative Treatment Of Malignant Disease, W Sampson Handley; Operations On The Breast, by the same author; Operations For Abdominal Injuries, by H. W. Carson; and Operations On The Stomach, by the same author; Operations On The Liver and Its Excretory Apparatus, by G. Grey Turner; Operations For Disease Of The Pancreas, by H. W. Carson; Splenectomy, by Carson; also Operations For Intestinal Obstruction, Enterectomy And Intestinal Anastomosis, Operations For Cancer Of The Large Intestine, and Operations For The Relief Of Abdominal Ptosis And Intestinal Stasis, by A. J. Walton.

Volume II contains the following: Operations For Appendicitis, Hernia, Cancer Of The Rectum, by H. W. Carson; Operations For Stricture Of The Rectum (Non-Malignant), Hemorrhoids, Fistula In Ano, Prolapse, by Hamilton Drummond; Operations On The Skull And Brain, by L. B. Rawling; Operations On The Ear, by S. R. Scott; Operations On The Eye, by E. W. Brewerton; Operations On The Nose And Pharynx, by W. D. Harmer; Operations On The Larynx and Trachea, by H. G. Bedford Russell; Operations On The Oesophagus, by T. H. Just; Operations On The Tongue, by C. C. Choyce; Plastic Surgery, by H. D. Gillies; Operations On The Neck, by W. E. Tanner; also Operations For Cancer Of The Lips; Operations On The Thyroid Gland, by A. J. Walton; Operations On The Kidneys And Ureter, by Sir John Thompson-Walker; Gynaecological Operations, by A. E. Giles; Operations on the Bladder, Prostate And Seminal Vesicles And Urethra, by Sir John Thomson-Walker, and Operations On The Penis And Testicle, by John Everidge.

Medical Education. A Comparative Study. By ABRAHAM FLEXNER. Published by The MacMillan Company, 1925.

In this book present conditions prevailing in the world's medical schools are reviewed against a background of past conditions of medical education and the general education of medical students prior to entering upon the medical curriculum. Modern medicine is looked upon as a science. In it "no distinction can be made between research and practise. The investigator obviously observes, experiments, and judges; so do the physician and surgeon who practise their art in the modern spirit." * * * "There is a widespread impression that the scientific quality of medical education and medical practise is in some fashion dependent upon the part played by the laboratory. This is not the case." * * * "Thus medicine, moving as rapidly as may be towards scientific status, recognizes no difference in intellectual attitude between laboratory and clinic." These quotations express very well Mr. Flexner's attitude toward medicine.

The influences in the various countries that

worked to produce the present-day schools in each are traced. It is shown how "the clinical type of school" originated in France and in England where the hospital entirely dominated the scene and university played but a minor role. In sharp contrast is the medical school of the north and central European countries, "the university type," in which university traditions and university methods of education were applied in medicine because the medical school was an integral part in every respect of the university. The weaker features in each type are pointed out.

The better American schools represent a combination of factors copied from each but on the whole Mr. Flexner regards Amreican schools as still inferior to the continental European type. In all countries curricula are overcrowded to the detriment of pedagogic methods. The author recognizes that no longer should schools expect to train men ready for practise and this recognition, if generally applied, will permit of curtailment of curriculum.

The various laboratory sciences are contrasted for each country as to conditions 15 years ago and at present. France is very backward in equipment. Some recent improvements have come in Holland and England. Germany with its splendid institutes has suffered enormously since the great war. In America very great progress has been made but development is very uneven.

In similar way the clinics are discussed. In France more than half the student body actually has definitely inferior teaching; in Great Britain each student has excellent clinical opportunities where he learns medicine as an intelligent apprentice, but he is not trained with a view to advancing with progress in medicine and hardly at all to help in this advance. In the German clinics the student does far too little for himself. Instead he watches master clinicians solve clinical problems. The independence of the methods of university life in Germany, however, do inculcate more of a receptive spirit for advance and produce more investigators. The student finds for himself opportunities, but it is to the smaller group of graduate assistants that the great opportunities come.

In America development is very uneven and the bulk of clinical teaching is below university standard and yet progress has been enormous There is a definite tendency in America to over guide the student when he is doing for himself and there is very little freedom given the student to follow his own way, largely the result of the rigid division into classes and the lack of opportunity for migration. However, after graduation, as in Germany, now there are many assistantships that allow of advanced training. It has seemed to the reviewer that the paucity of these in the past has been a very important reason for the comparative backwardness of medicine in the United States. In this country professors in clinical branches are appointed lacking in any great clinical experience because of their too short apprenticeship in the clinics as assistants. This has been notably the case in very recent years and is another reason for the weakness of our clinics. With our progress in many directions too few of our professors are really great clinicians; in fact less than in previous generations.

There is a chapter on institutes for medical research which is in the main a defence of them. To the reviewer it would seem that hardly a good case is made out for the independent institute for medical research except as part of governmental health work. Otherwise the argument would seem to indicate that, were they an integral part of a university, they would have greater usefulness than as separate institutions, by reason of the value to them of the opportunities of contact with the different university institutes of pure science; a value that the author does not ignore. Their influence on the medical school of the university certainly would be of great value. Organized within a university they need lose none of their independence and certainly they would have no lessened opportunity for the training of younger men. Since throughout the book there is emphasis on the great value to the medical school of close affiliation with the university, it would seem logical to apply the same to the independent institute of medical research and make a plea for the placing of both as departments of the university.

This book contains much helpful information in regard to medical schools and their development. It is well written and well printed. It is rather disappointing from the point of view of suggestions for betterment of medical education as no very concrete plan for an ideal school is proposed, though the critical discussion of medical education in the several countries helps to that end. As medical education is still in the experimental stage perhaps it is far wiser to deal in this way with the subject; giving attention to the past and present of medical education rather than to its future.

In America the critical survey is being applied to many things. Often the survey is conducted by one who has had no first hand experience in the field being surveyed. This detachment has possible advantages as well as disadvantages. It is interesting that in this book, which in a sense is such a critical survey, the usual American plan is followed and the author, as shown by his biography in Who's Who, has never been connected with a medical school nor does it appear that he has ever had any personal experience as a teacher in any department of a college or university. One wonders whther this enhances or not the value of the book to those concerned in the conduct of medical education.